P U B L I C   N O T I C E
EXTENSION OF COMMENT PERIOD

The Montana Department of Environmental Quality (Department), Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Section, issued a Public Notice on November 10, 2005, concerning an application for a major change to a solid waste management system. The name and address of the applicant is:

Flathead County Solid Waste District, 4098 Hwy 93 N, Kalispell, MT 59901

The application is for the proposed expansion of the Flathead County Class II landfill. The existing landfill is located approximately seven miles north of the City of Kalispell at 4098 Highway 93 North, Kalispell, Montana. The landfill occupies approximately 80 acres in the NE¾ of Section 1, T 29 N, R 22 W. The District proposes to license 189 additional acres of County-owned land immediately south of the existing facility, which would add an additional 15 to 38 years capacity for the disposal of municipal solid waste.

The November 10, 2005, Public Notice contained a typographic error in the address for citizens to submit electronic comments on the proposed action.

The purpose of this notice is to extend the public comment period on the proposed action, to seek public participation in the decision-making process and to provide the correct contact information for the Department. To comply with the Administrative Rules of Montana 17.4.607(2), 608, 609, and 610, an Environmental Assessment has been prepared and a copy is available upon request from the Waste and Underground Tank Management Bureau, Solid Waste Program, P.O. Box 200901, Helena, MT 59620-0901, or on the Department's website at http://www.deq.state.mt.us/ea/WasteMgt.asp. The public has until January 3, 2006 to submit written comments concerning the proposal. The public may also submit comments via E-mail at wutbcomments@mt.gov. Please call (406) 444-5300 for information or assistance.

Dated this 9th day of December 2005.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Solid Waste Program
P.O. Box 200901
1620 E. Sixth Avenue
Helena, MT 59620-0901

ENVIRONMENTAL ASSESSMENT

Division/Bureau

Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Program

Project or Application

The Flathead County Solid Waste District (District) submitted an application to the Solid Waste Section of the Department of Environmental Quality for an expansion of the Flathead Sanitary Landfill, License No. 18.

The exiting municipal landfill serves approximately 74,471 residents (2000 census) and expects to receive approximately 115,000 tons of waste per year for the next five years. The landfill receives waste from Flathead County region that includes Kalispell, Whitefish, Evergreen and Columbia Falls. With the planned construction of Phases III and IV, the 123-acre existing landfill has a remaining disposal capacity of approximately 4,900,000 cubic yards. This provides a life of approximately 19 years if the amount of waste increases at a rate of 2% per year, 17 years if the increase is 4% per year, and 14 years if the increase is 8% per year.

The District is proposing to license an additional 189 acres of adjacent County-owned land north, south and east of the currently licensed landfill for management and disposal of Groups II, III, and IV waste. The 91.5-acre disposal footprint of the proposed expansion area would provide an additional disposal capacity of approximately 2,321,000 cubic yards in Phase I, 6,407,000 cubic yards in Phase II, and 8,214,000 cubic yards in Phase III. The proposed expansion would extend the total life of the facility by approximately 15 years at an 8% increase in waste generation to approximately 38 years at a 2% increase.

<u>Facility History</u>. The landfill was first licensed by the State of Montana in 1971. From 1971 to 1993, waste was placed in unlined, 50-foot wide, 40 to 50 foot deep trenches in the 32.8-acre area on the north and east side of the currently licensed facility. The trenches were oriented north-to-south. After the trenching phase was terminated, a soil cover was placed over the trenches. Subsequently refuse was placed over the trenches to heights of up to 100 feet using a landfill method called an area fill.

Montana landfill rules changed significantly in 1993 in response to changes in Federal regulations. Prior to 1993, liners were not required at Montana landfills. The 1993 changes required that new landfill cells be lined, with limited exceptions. Under the new rules, waste could be piled higher over an existing footprint, but unlined lateral expansions were not allowed.

The pre-1993 footprinted area was used for municipal solid waste until the first lined cell was completed in 2002.

Phases IIA and IIB of the existing landfill are Class II units with a combined area of approximately 9.5acres. The Phase II excavations, composite liner systems, and leachate collection and recovery systems were constructed to comply with the Administrative Rules of Montana (ARM), Section 17.50.506. The Phase IIA unit received waste from July 2002 until April 2004. The Phase IIB unit began receiving waste in April 2004.

Currently, the west side of the currently licensed area is broken into Phases III and IV. These phases are separated by a ridgeline in the floor. The east portion of the floor is Phase III. It drains into the existing leachate collection system constructed as part of the Phase II liner construction project. Phase IV would have a separate leachate collection system in the northwest corner which would only be the leachate collection point or sump for Phase IV.

Description of Project

Site Location. The facility is located approximately seven miles north of the City of Kalispell at 4098 Highway 93 North, Kalispell, Montana (Figure 1). The facility is at Latitude N 45°18'53" and Longitude W 116°13'25". The site lies mostly within the northeast three-quarter of Section 1, Township 29 North, Range 22 West, and the south half of Section 36, Township 30 North, Range 22 West. The property is recorded as Assessor's Tracts 1A, 2C, 3A, 4A, 4-1A, 4AB, 4AC, 6B, 7, 7A, 7B, 7BB, and 7C in Sec. 1, T. 29 N., R. 22 W., and Assessor's Tracts 1 and 1BH in Sec. 36, T. 30 N., R. 22 W., P.M.M., Flathead County, Montana. The proposed expansion area is adjacent to the existing Licensed Area as shown in Figure 2.

The facility is located approximately 3.2 miles (approximately 16,800 feet) west of the Glacier International Airport. According to the ARM 17.50.505(2)(c)(ii), the District would need to notify the FAA and the airport of the proposed landfill expansion because the lateral expansion is "within a five-mile radius" of an airport runway.

Site Topography — The terrain at the landfill and surrounding area consists of northwest to southeast trending drumlins composed of glacial till. Original ground surface elevations range from 3,030 to 3,170 feet above mean seal level. Currently developed portions of the site reach a maximum elevation of approximately 3,210 feet above mean sea level in the active landfill area.

Site Geography. The site is in the south central portion of Flathead County where the Flathead River network drains the upper Flathead Valley from its forested headwaters in

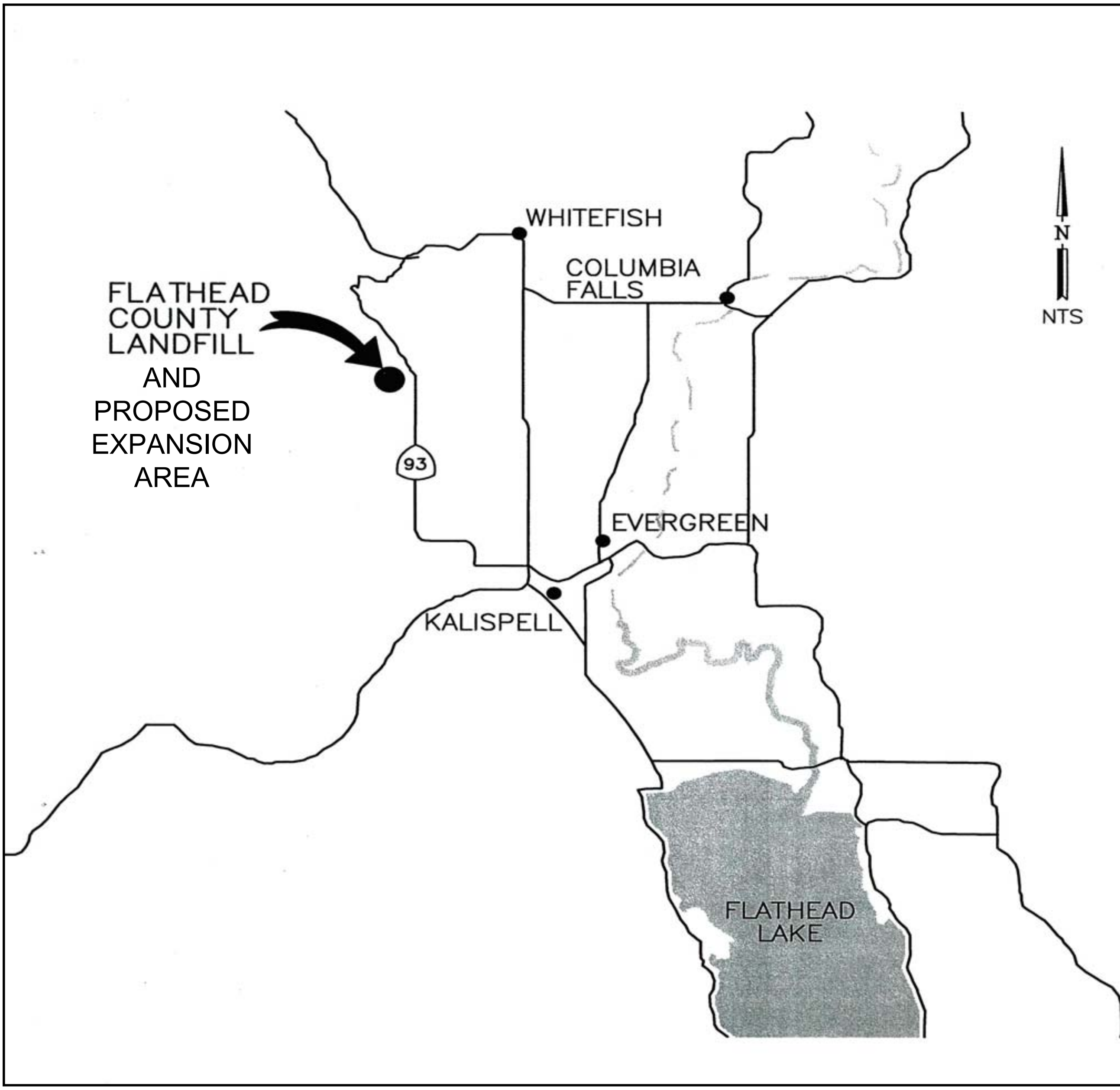

Figure 1. General site map showing location of licensed
Flathead County Class II Landfill and proposed expansion area (BAS, 2005).

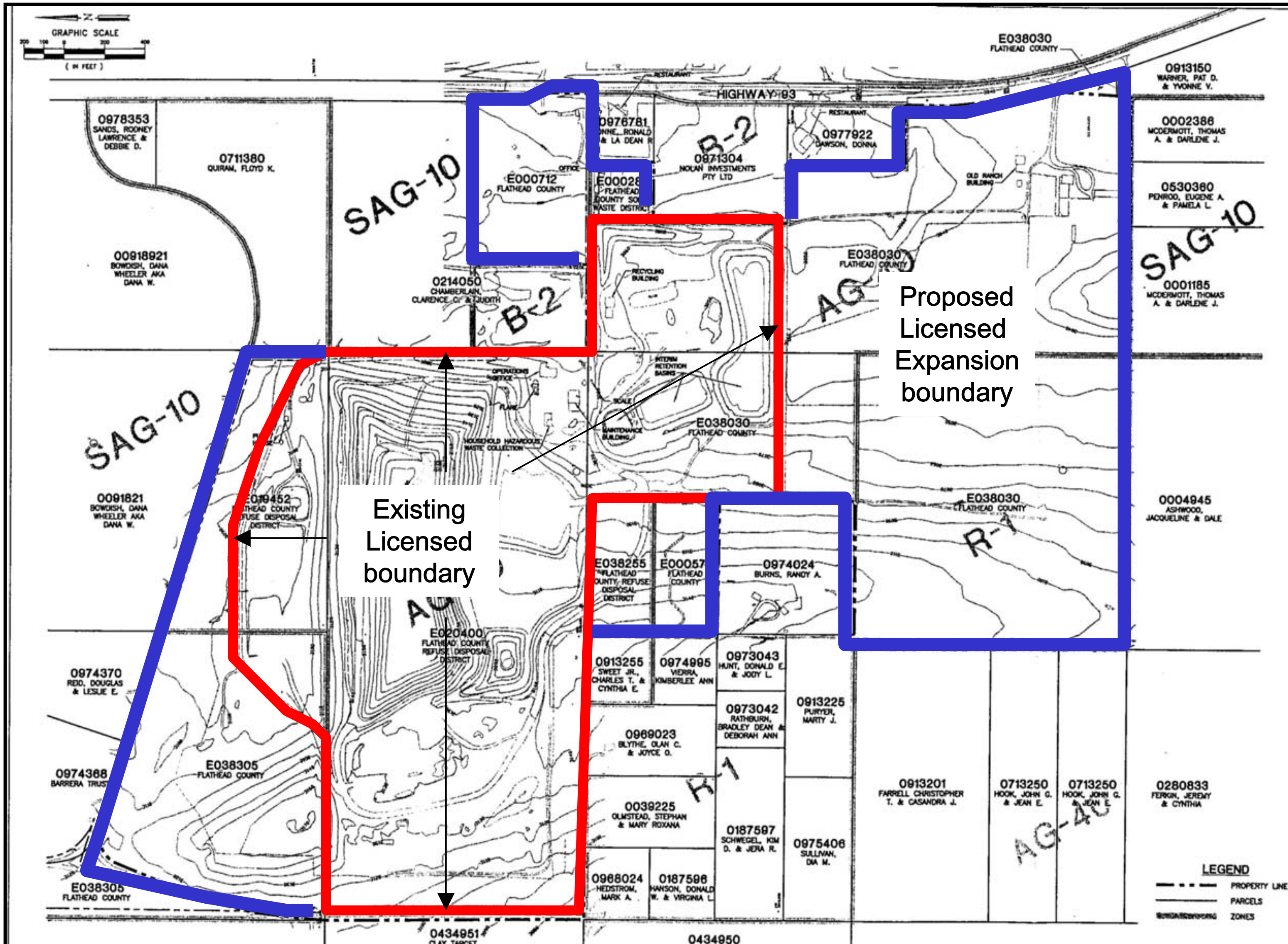

Figure 2. Map showing existing licensed boundaries and proposed expansion area (BAS 2005).

the north toward Flathead Lake and grasslands in the south. The predominant landforms in the hilly region between Kalispell and Whitefish are knob-and-kettle terrain developed in glacial till that blankets the broad valley floor between bedrock highlands of the nearby Salish Mountains to the west and the steeper Swan Range farther east.

The facility and proposed expansion area lie in a cluster of northwest-to-southeast trending drumlins between the Whitefish River two miles to the east and the Stillwater River eight-tenths of a mile to the west. Land use in the surrounding area is dominated by cultivation of alfalfa and hay crops or livestock grazing in the grasslands with real estate development in the timbered areas.

A wetland area, located approximately one-quarter mile south of the expansion area, is not believed to be associated with a surface expression of groundwater. The wetland is classified by the U.S. Fish & Wildlife Service, National Wetlands Inventory as "palustrine, scrub-shrub, temporarily flooded" in the National Register Information System database. In wetlands of this type, "surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season" (USFWS, 1979). Because the wetland is in a topographic depression and the underlying silty soils have a relatively low-permeability, it is most likely that temporary flooding of the area is due to poor drainage particularly during spring snowmelt and rainy periods.

The site is on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Community Panel Numbers 300023 1415 C and 300023 1405 C. The landfill is located in zone "C", which is not in a 100-year or 500-year floodplain. There is a 15.5-acre depression southeast of the landfill that is in zone "A". Zone "A" is designated as an area that is subject to a 100-year flood.

<u>Geology-Hydrogeology</u>. The Kalispell Valley is in the northern Rocky Mountain overthrust belt of the ancient Cordillera Province that was largely influenced by subduction of oceanic crust from the west beneath the continent to the east. Bedrock in the area generally consists of Proterozoic metasedimentary rocks of the Belt Supergroup. The bedrock geology of the Kalispell area is dominated by ancient mountains that formed during early contraction and stacking of Belt thrust sheets. The large graben valleys were formed during subsequent extension and normal faulting of blocks flanked by uplifted bedrock mountains that are visible today. The major period of mountain building occurred about 60 to 100 million years ago during the protracted Late Cretaceous Sevier-Laramide Orogeny.

The Kalispell Valley, including the present-day Flathead Valley, is believed to be part of the Rocky Mountain Trench extending northwest to the Tobacco Valley and southeast through the Swan Valley. During Tertiary time the Kalispell Valley was partly filled with material eroded from nearby mountains and carried by ancestral rivers. During Upper Pleistocene, the Tertiary valley-fill sediments were partly eroded and their remnants were buried beneath ice-contact and glacio-lacustrine deposits. As the ice sheet from the last glacial stage melted, glacial Lake Missoula (ancestral Flathead Lake) extended northward and the Kalispell Valley was flooded. Sand, silt and clay were deposited in glacial Lake Missoula, with local thicknesses ranging as high as several hundred feet. While the lake was receding about 12,000 years ago, the Flathead River and its tributaries cut their courses about 100 feet into the unconsolidated valley-fill deposits. The total depth of valley-fill deposits is unknown, because drilling has not fully penetrated the deposits. Konizeski et al (1968), however, estimate the depth of valley fill to be approximately 3,700 to 4,800 feet based on gravimetric surveys. These upper Pleistocene glacial sediments cover the surface and extend at depth beneath the proposed expansion area, affecting engineering of the landfill units and hosting the aquifers that are monitored beneath the facility.

Groundwater resources of the upper Flathead River valley are generally defined by three distinct units, from top to bottom: (1) A shallow, usually unconfined aquifer perched in permeable ice-contact stratified drift, glacial outwash, or alluvial sequences; (2) An impermeable confining layer that separates the two aquifers; and (3) A deep, confined sand and gravel aquifer in older fluvial sediments or basal sediments beneath the glacial sequence. Groundwater is found in both the shallow perched aquifer and the deep sand and gravel aquifer beneath the existing landfill. No evidence of the perched aquifer was found during investigation of the proposed expansion site. Nearby private water supply wells rely on these groundwater resources for drinking water (Figure 4).

<u>Landfill Features</u>

Two large mounded waste management units would be the dominant features of the expanded facility, one in the currently licensed area and one in the proposed expansion area.

Areas located adjacent to the proposed expansion area waste management units would be developed for groundwater and methane monitoring systems, leachate pump stations, methane flare system, storm-water detention ponds, white goods and scrap metal stockpile, borrow excavation, cover soil stockpile, and special waste areas. Upon closure of the proposed expansion area units, a single continuous, composite landfill cap (Figure 6) would cover the waste. Methane would be collected by an active gas removal system in methane wells that penetrate the cap. The methane would be removed for burning at the flare. Erosion of the cap would be minimized by vegetation of the final cover.

The existing entrance area including the operations building, scale and scale house, maintenance and repair building, resource recovery area, landfill gas recovery plant, and access roads may be used during the entire operating life of the landfill. A second entrance with a scale and scale house is planned for the south Phases I though III. This entrance would be located in the southeast corner of the site and could be used as the main entrance if it would facilitate operations during the expansion phases.

Waste Management Units — The existing landfill has approximate 4.9 million cubic yards million cubic yards of capacity left. The seven acre Phase III and 12 acre Phase IV are the units that will complete the filling of the existing licensed area.

The unit proposed to be the new Class IV unit in the currently licensed area will be placed adjacent to Phase II. The conceptual design for the Class IV unit has the approximate capacity of 560,000 cubic yards. This area will also be excavated in phases. A liner would not be required for the Class IV unit because it is within the groundwater monitoring system of a Class II facility.

The proposed expansion area units would be developed in three phases using the area-fill method. The proposed expansion would have a capacity of approximate 16.9 million cubic yards of waste. The construction sequence of the proposed expansion would be from east to west then north to south. The size of the Phases is Phases I, 23 acres, Phase II, 31 acres, and Phase III, 37 acres, (Figure 3). The phasing of the proposed expansion is conceptual and actual phasing could vary from the plans. It is anticipated that each of the three major phases of development would consist of smaller fill sequences.

The proposed expansion area would be developed with composite liner and leachate collection and removal systems constructed on a sloping base. Seismic stability would be improved by keying the waste mass into the underlying glacial till after excavation of the overlying strata.

A subdrain system on the side slopes of the units is not anticipated based on the geotechnical investigations. However, based on past experience, small seeps could be encountered due to changes in permeability of lenses on the cut slope. If the excavation encounters any seepage areas, a subdrain system would be included in the liner construction and would be designed to drain to a collection point that can be monitored and pumped if necessary.

The lowest base elevation proposed for the existing landfill is approximately 3,074 feet and for the proposed expansion is approximately 2,970 feet. The total thickness of waste and cover material at the deepest point would be approximately 180 feet in the existing landfill and 240 feet in the proposed expansion. The base elevations of all the un-built and proposed waste management units are above known groundwater elevations. The base of each proposed unit would have a composite liner. The leachate collection and removal system would be constructed over the liner prior to acceptance of waste. Each unit would be filled in lifts 10 to 15 feet high and would advance laterally with a working face approximately 75 feet wide.

The facility is separated from the deep artesian sand and gravel aquifer by Pleistocene glacial sediments. In the vicinity of the landfill, the water bearing strata of the deep aquifer are typically found at depths ranging from 180 to 240 feet below ground surface. After the strata are penetrated by drilling, the static water levels typically rise in the borehole to 60 to 100 feet below ground surface. The proposed landfill base elevation for

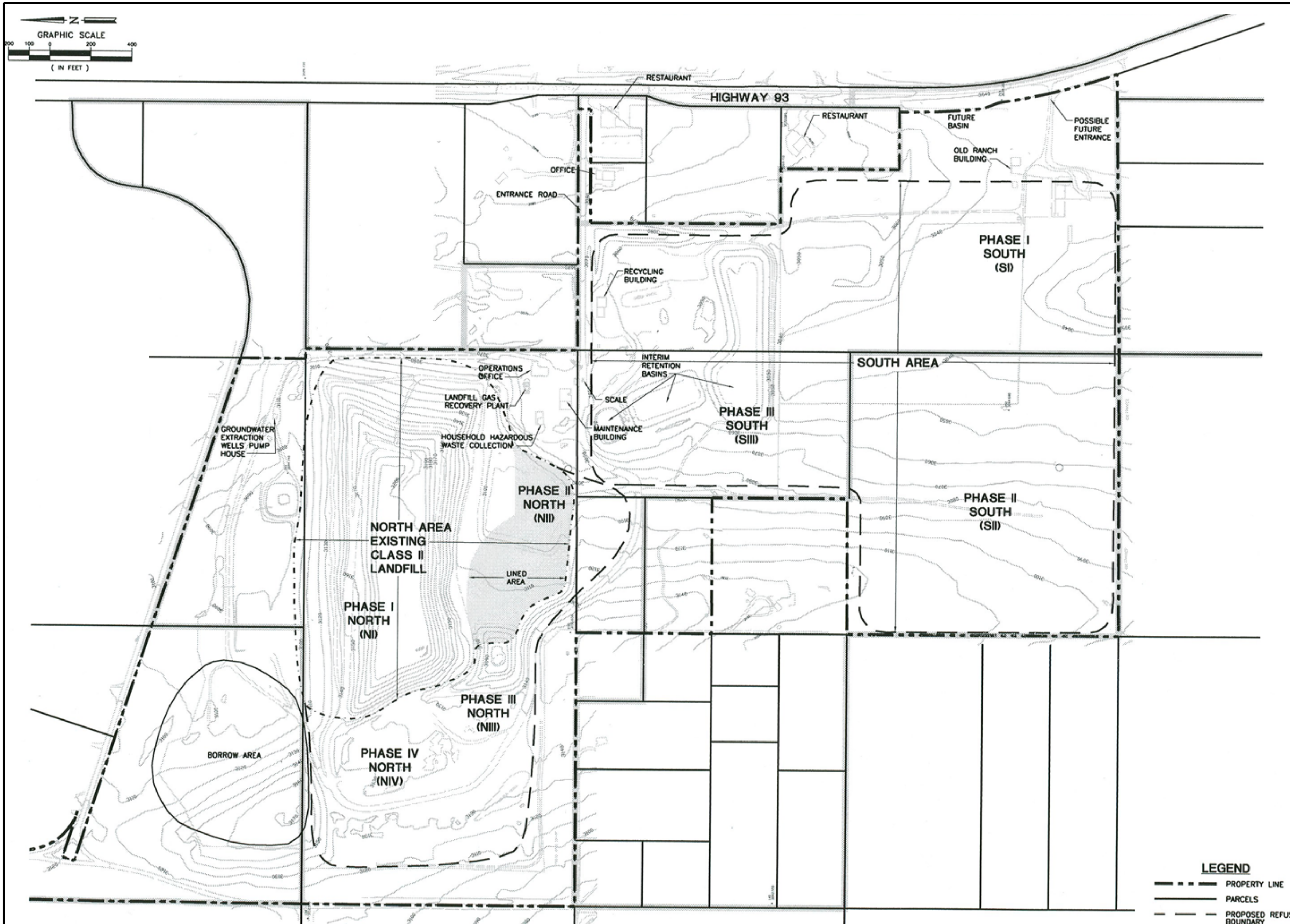

Figure 3. Site Plan Showing topography and construction phases (BAS 2005).

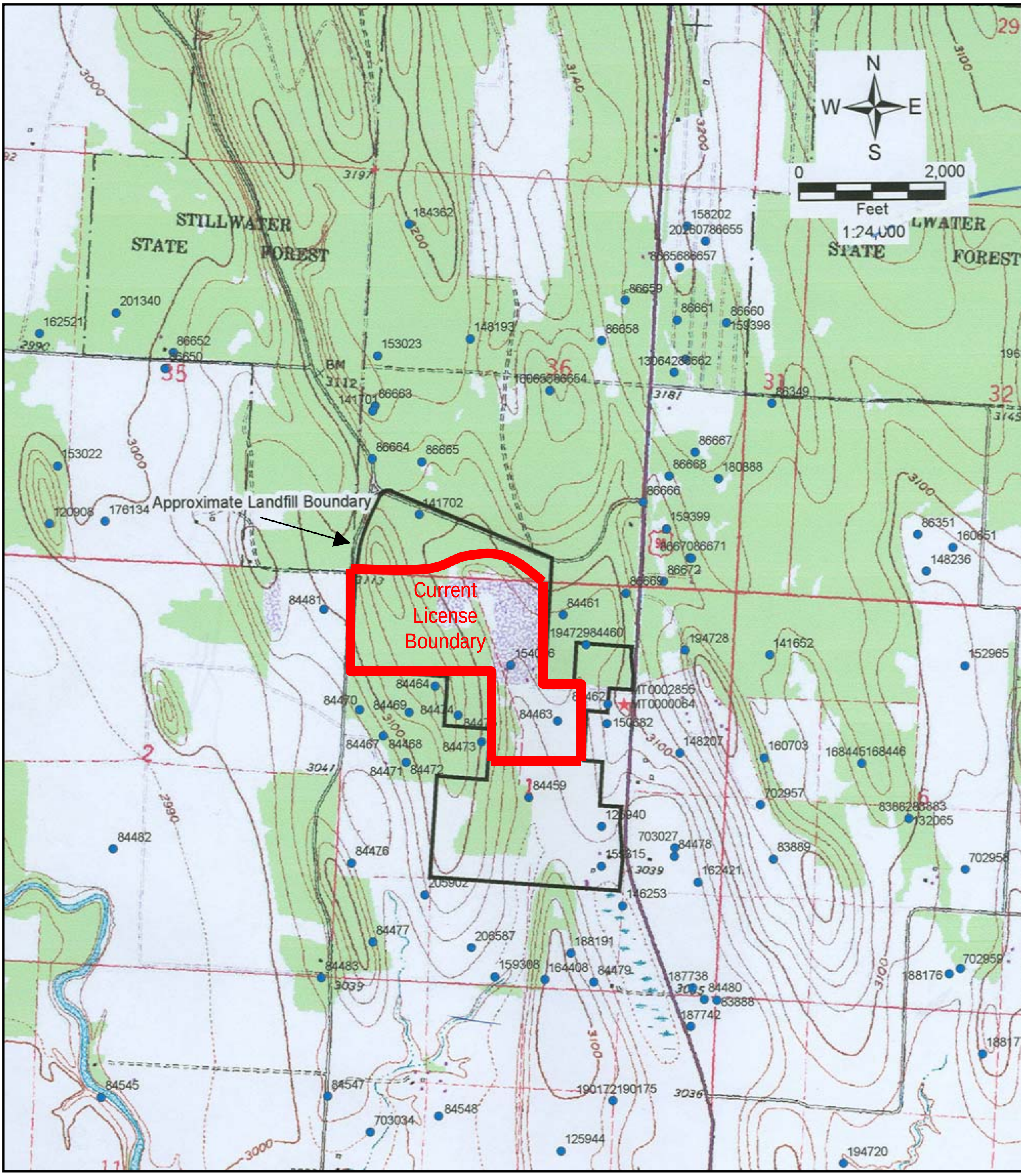

Figure 4. Map showing wells in the deep aquifer near the Flathead Landfill (L&W, 2003)

the proposed expansion area units is 2,970 feet, or 65 feet below the ground surface. This is approximately 115 feet above the top of the artesian aquifer (Figure 5).

Leachate Control — Leachate from each unit would seep to a single collection sump at the southeast corner of the expansion area. From there, it would be pumped to a leachate collection tank at the surface.

The expansion area liner system is designed in accordance with ARM § 17.50.506 requirements for a Class II liner system. The proposed liner is an alternative liner equivalent to a standard prescriptive liner. The base liner components would consist of (from bottom to top):

- Prepared subgrade;
- Double non-woven geotextile backed GCL [coefficient of permeability (k) < 5.0×10^{-9} cm/sec.] or 2 feet of low-permeability soil [k < 1.0×10^{-7} cm/sec.];
- 60-mil HDPE, double-textured geomembrane;
- Non-woven geotextile cushion;
- A drainage layer of nine-inch minimum thickness of rounded 3/8-in minus gravel;
- Non-woven geotextile separator and;

  One-foot minimum of protective cover soil.

The leachate collection and removal system would include gravel leachate collection swales with a main header and lateral collection pipes that would collect leachate from the gravel drainage layer and from the HDPE geonet on the side slopes of the liner. The proposed 200-ft spacing of the 6 to 8-inch diameter slotted HDPE lateral pipes and headers was determined by HELP3 leachate generation modeling. The leachate would drain to a double-lined gravel sump system, which would have 24-in diameter HDPE risers and a dedicated pump for lifting leachate 68 feet into an aboveground 6000-gal leachate storage tank. Leachate would flow through double-walled 6-in diameter PVC outfall pipes would from the lift station to the leachate storage tank. The leachate storage tank would either be double-walled or would include secondary containment built into the underlying concrete pad. Leachate would be collected and applied to the waste lifts, applied to the active working face, or used as dust control over the composite-lined portions of the landfill. The level of leachate in the drainage layer and the quantity of leachate in the tank would be regularly monitored and reported to the Department.

Based on the geotechnical investigations, a subdrain system on the side slopes is not anticipated. However, based on past experience, small seeps could be encountered due to changes in permeability of lenses on the cut slope. If the excavation encounters any seepage areas, a subdrain system would be included in the liner construction and would be designed to drain to a collection point that can be monitored and pumped if necessary.

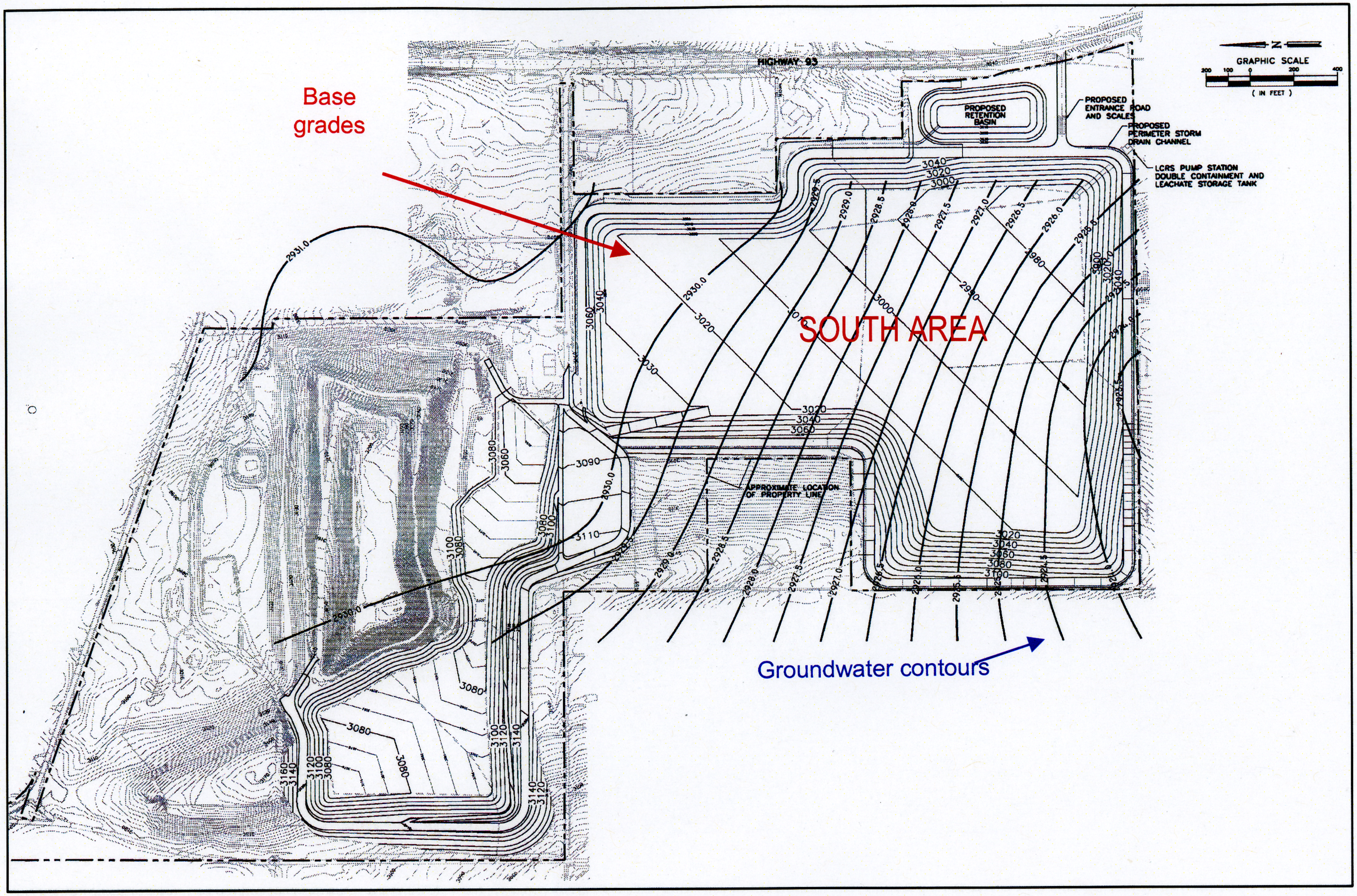

Figure 5. Landfill base grades and groundwater contours (BAS, 2005).

The slope liner system would consist of (from bottom to top):

- Prepared subgrade;
- Double non-woven geotextile backed GCL [coefficient of permeability (k) < 5.0 x 10^{-9} cm/sec.] or 2 feet of low-permeability soil [k < 1 x 10^{-7} cm/sec.];
- 60-mil HDPE, single-textured geomembrane (textured side down) placed above the GCL and;
- Double non-woven geotextile-backed high-density polyethylene (HDPE) drainage net and;
- Two feet of protective cover soil.

The geonet is designed to transmit twice the maximum anticipated leachate flow. The geonet would blanket the entire slope area and would terminate beneath the basal gravel drainage layer at 5-foot offset inboard of the slope toe. The slope liner system would be anchored in a trench at the top of the excavation slope.

Leachate collectors would be constructed on benches. The gravel-bedded 4 to 6-inch slotted HDPE bench collector pipe would be connected to the basal collection layer pipe network by 4 to 6-inch diameter HDPE risers with clean-outs. If necessary, intermediate anchor trenches would be placed along slope benches as proposed.

Detention Ponds & Drainage Control — Surface water control includes protection of the landfill from surface water run-on and flood influence from the upstream watershed as well as proper handling of surface water runoff from the landfill areas. The drainage control facilities would include a network of top deck diversion berms and inlets, down drains, perimeter channels and bench drains for managing surface water runoff.

Permanent storm water runoff and drainage control facilities on site were designed to carry a minimum of the peak discharge resulting from a 25-year, 24 hour storm event — 2.4 inches of rain in 24 hours. The drainage network for the completed landfill is designed to carry storm water at velocities that would control run-off and minimize erosion.

The surface water control plan consists of an integrated system of bench ditches, perimeter channels, top deck perimeter berms, and storm water retention basin. The final landfill grades are designed so that surface water would run off the landfill in a sheet flow until intercepted by a deck berm or bench ditch. The bench ditches subsequently drain toward down drains which discharge to perimeter channels. Finally, the perimeter channels drain to a storm water retention basin.

All landfill surface water for the existing licensed area is routed to one of three basins, which are south of the scale house. These basins would remain in service until they would have to be removed as part of the landfill expansion. At that time, the basins would be relocated. There would be two new basins — one southwest of the existing scale house to handle the excess peak runoff. The other would be southeast of the expansion area between state highway 93 and the proposed expansion to retain the remaining run-off for use as irrigation or dust control on the landfill and internal roads.

The erosion control measures incorporated in the site design would include the following:

- Collection and control of runoff, diverting it away from highly erodible areas.
- Construction of intermediate and final landfill slopes with drainage benches at intervals designed to control slope runoff velocities and volumes.
- Hydroseeding, with fast germinating drought-tolerant grass seed, on intermediate surfaces that would be exposed for more than 180 days and all surfaces that are at final grade.

There is currently no discharge of storm water to surface water from the landfill. Consequently, the site does not have a Montana Pollutant Discharge Elimination System (MPDES) Storm Water Permit nor is there any associated monitoring. An MPDES storm water permit and associated monitoring is anticipated to be needed for the proposed expansion area.

Landfill Gas Control and Methane Monitoring Systems — An active landfill gas extraction system is installed on a portion of the existing landfill. The existing system is composed of approximately 25 vertical extraction wells that actively collect gas from the waste and headers and lateral piping to convey extracted gas to the flare station. The flare station is at the southeast corner of the existing landfill. The gas extraction system would be expanded as the new phases are constructed.

At a minimum, the expansion area system would incorporate the following equipment:

- Enclosed ground flare facility;
- Vertical extraction wells;
- Condensate management system components; and,
- Landfill gas migration monitoring probes.

The vertical extraction wells and any horizontal collectors would be connected to a looped collector system that would be installed around the perimeter of the landfill. The proposed system elements could be installed above or below grade. The gas extraction system would be expanded in phases as the landfill expands. The existing flare station would be upgraded as needed (i.e. additional flares and blowers) to accommodate the gas volume as the landfill expands.

The looped gas header system would allow the operator to divert the landfill gas in the opposite direction by shutting isolation valves whenever the gas extraction system would require upgrades, maintenance, or repairs. Only a very small portion of the extraction system would be taken off-line while maintenance was being performed, minimizing the potential impact of surface emissions and subsurface gas migration. Under normal operation, the looped header design would allow landfill gas to be routed through both of the extraction headers and significantly reducing the required line sizes.

The proposed gas extraction system would incorporate vertical wells to comply with regulatory standards. Horizontal wells could be installed to augment the vertical well system. As the landfill expands, it is anticipated that most of the system would be installed, with the balance of the system completed as part of closure. During closure construction, the system would be taken off-line in phases as the final cover system was installed; the system would be modified, as necessary, and would then be reconnected.

As the new cells would be filled, additional vertical extraction wells would be installed in phases to control surface landfill gas emissions. These wells could be extended as the fill progresses in the cell, or abandoned and replaced with new wells when the fill reaches the final grade elevation. A specific design would be completed for the expansion of the gas system that would take into account benches and other design elements.

As the fill would progress toward the final grade, additional vertical extraction wells would be placed into the upper portions of the landfill to achieve the proper spacing required for surface emissions control.

Permits would be obtained from the Department and other appropriate agencies for the construction and operation of each phase of gas system development.

The effectiveness of the landfill gas extraction system would be monitored by perimeter gas migration probes according to ARM 17.50.511(1)(g). If perimeter compliance levels were exceeded in any probe, adjustments to the landfill gas control system would be initiated or additional methane extraction wells would be installed, as needed.

Closure — The final cover system is designed according to ARM § 17.50.530 and the cap currently proposed for the top deck of the south expansion area consists of the following components, from bottom to top

- A minimum two-foot thick layer of approved soil, contaminated soil, incinerator ash, or other waste materials placed immediately over the entire surface of the last lift of refuse. This layer would have the appropriate engineering properties to provide a relatively unyielding surface upon which to place the low-hydraulic-conductivity layer.

  This component would provide a low-hydraulic conductivity barrier to water infiltration through the final cover system in order to minimize leachate generation, to control landfill gas migration, and to separate the waste from vectors. Because the liner containment system would include a composite liner system with a geomembrane, and possibly a two-foot low-permeability layer or GCL at the bottom of the landfill, the final cover system would include a very flexible polyethylene (LLDPE) geomembrane barrier layer overlain with HDPE geosynthetic drainage strips. The maximum hydraulic conductivity of this final cover layer would have to equal to the least permeable component of the liner system and may not exceed $1x10^{-7}$ cm/sec.

- A minimum one-foot erosion control (vegetative) layer that would include a minimum six inches of topsoil. This component would protect the barrier layer from frost, wind and water erosion, support vegetation and improve aesthetics, and minimize long-term maintenance.

The proposed top deck elevation would be 3,225 feet. The final grade configuration for the expansion area (Figure 6) would consist of top deck gradients of 5 percent sloping toward top deck perimeter berms. The top deck berms would divert surface flows to down drains. Landfill slope runoff would also be directed to down drains by benches located at 50-foot maximum vertical intervals. Slope ratios for all slopes are proposed at 3:1 (horizontal to vertical) between benches for a gross slope gradient of 3.4:1. A Preliminary Closure/Post-Closure Maintenance Plan has been prepared and will be updated periodically, as on-site conditions change.

Other Disposal Areas & Temporary Storage Areas — The resource recovery area is located west of the storm water ponds and southeast of the scale. The recovery program concentrates on green and metal wastes. The green waste is ground into mulch for composting or biomass. The metal program recycles junk cars, appliances and miscellaneous metal. Other materials collected in this area include newspaper, cardboard, aluminum, magazines, car batteries, plastics, etc.

Gate House & Equipment Storage Buildings — The support facilities for the landfill consist of an entrance facility area, scale and scale house, maintenance and repair building, resource recovery area, landfill gas recovery plant, a groundwater extraction well system, and sedimentation/retention ponds.

The entrance facility area includes the site operations building, and both gravel and paved parking areas for employees and visitors. The operations building consists of an office, change room, lunchroom and restroom/shower facilities. The District office is located just south of Disposal Road, 400 feet west of Highway 93.

One scale house is located at the site. The scale house is located at the southeast corner of the licensed area at the west end of Disposal Road. Incoming waste loads are weighed and monitored at the scale houses and all vehicular activities are regulated in accordance with the established Load Checking Program.

The Maintenance Shop is located immediately north of the scale. The Maintenance Shop is a complete vehicle maintenance and repair service facility for onsite heavy equipment and the District's trash hauling fleet.

Soil Borrow Areas and Soil Stockpiles — Soil excavated at the site would be stockpiled adjacent to each landfill unit during each phase of construction. A large soil borrow area located at the northwest corner of the licensed north area would be used as needed during operations and during construction of final cover.

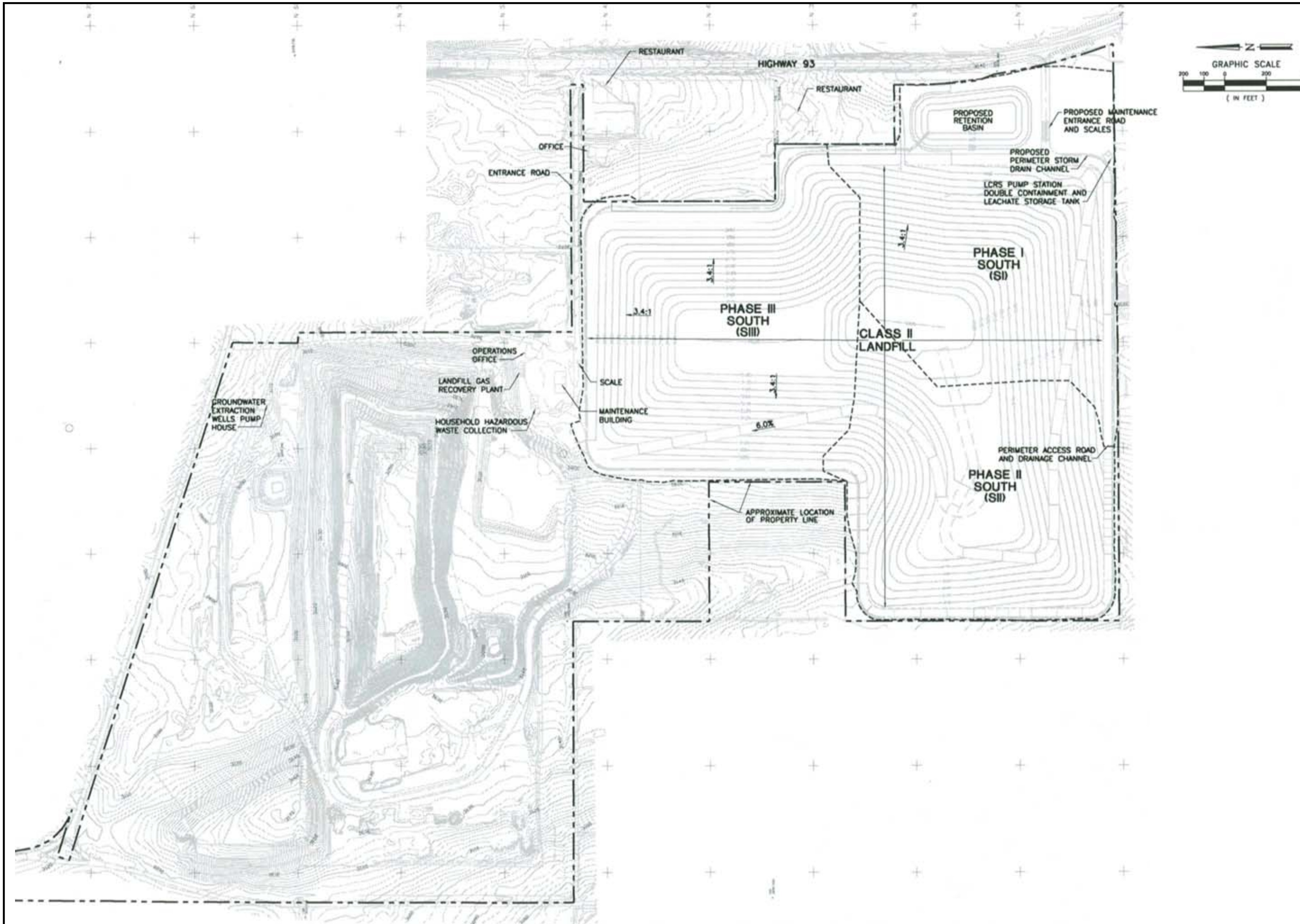

Figure 6. Map of South Area final cover elevation (BAS, 2005).

Other Landfill Features — Other prominent features of the current landfill include a household hazardous waste storage building, a junk vehicle processing and storage area, a white goods storage area, a recycling facility building and a yard waste storage area. These areas would continue to be used if the landfill expansion is approved and constructed.

Groundwater Monitoring Systems. — The groundwater monitoring network (Figure 7) at the existing landfill and the proposed expansion is designed to provide early detection of a release from wastes to groundwater. This network is designed to comply with requirements in ARM 17.50.700 et seq. and to provide background and downgradient water quality monitoring. The key components of the groundwater monitoring system are listed below. The detailed Groundwater Monitoring Plan can be found as part of Appendix K of the Landfill Expansion Document.

A qualified hydrogeologist/groundwater scientist designed the existing monitoring system. The boring logs were prepared under the direction of a trained geologist and have been submitted to the Department. At the existing licensed landfill, the groundwater monitoring network includes 13 groundwater wells (MW-1, 2, 2B, 3, 4, 5, 6, 6D, 7, 8, 9, 10, and 11, (MW-2 is planned to be abandoned by the end of October 2005). Depths of monitoring wells range from 36 to 345 feet below ground surface.

Six new groundwater monitoring wells (MW-2R, MW-7, MW-9, MW-10, MW-11S, and MW-11D) were installed during the site characterization necessary to update the Soils and Hydrogeology Study for the expansion area (Figure 7). Based on the current potentiometric surface map (Dec 2004 data) for the confined deep aquifer, flow lines from beneath the Phase I subunit appear to converge on monitoring well MW-10. Prior to placement of waste in the Phase I subunit, the District would: (i) assess the need for an additional relevant point of compliance groundwater monitoring well along the southern boundary of the proposed expansion area, (ii) submit a work plan, (iii) obtain final approval for well placement and screening, and (iv) complete and test the new well. At least one new well may be needed downgradient to the proposed Phase II unit based on current flow beneath the proposed expansion area.

Key components of the proposed groundwater monitoring network include:

- Wells currently used to monitor the active and historic landfill areas will continue to be monitored to provide closure and post-closure monitoring of the currently licensed area

- Existing unimpacted upgradient wells (MW-1) would continue to provide information on background water quality for both the existing and proposed landfill areas.

- Existing unimpacted wells in the currently licensed area that are downgradient of Phase I and II and upgradient of Phase III (MW-2, MW-4, MW-5) would provide additional background water quality data for the Expansion Area. However,

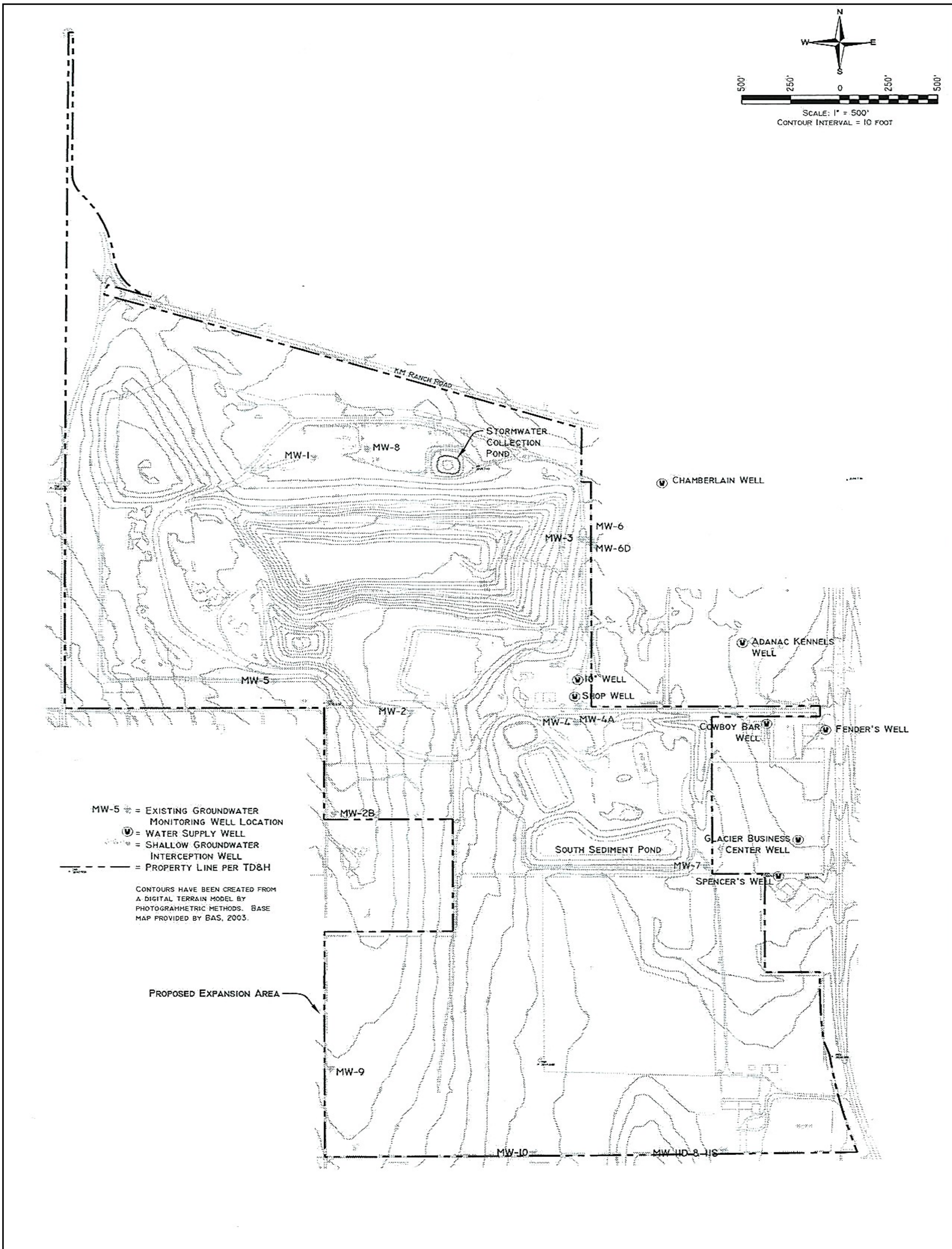

Figure 7. Map showing facility groundwater monitoring wells (L&W, 2005).

MW-2 would have a limited lifespan, since the well must be abandoned to accommodate the Class IV area. MW-2B was installed in 2004 to replace MW-2.

- Existing wells MW-2B, WM-7 WM-9, MW-10 and MW-11 would provide for downgradient and cross gradient monitoring of the Phase II expansion area.
- Monitoring of selected domestic wells would continue as needed to monitor corrective action effectiveness.

The monitoring parameters proposed for the expansion area are consistent with the parameters that are currently tested for in the currently licensed area and comply with required parameters in Table 1 of ARM 17.50.708. In addition to these laboratory analytical parameters, static water level elevation and field measurements of pH, temperature and specific conductivity will also be recorded. Groundwater monitoring will be conducted twice per year during high and low groundwater levels in accordance with ARM 17.50.708 (4).

Corrective Action Systems — The existing landfill is currently following a Corrective Action Plan for groundwater contamination by volatile organic compounds (VOCs). To comply with the plan, a three-pronged approach has been implemented to control further contamination. (1) A series of extraction water wells along the northern boundary of the currently licensed Phase I area extract the groundwater from the perched water table before it has a chance to come in contact with the waste in the old trench fill operation. The extracted water is pumped to the retention basins south of Disposal Road area for evaporation and irrigation of the alfalfa field. (2) A landfill gas extraction system removes landfill gas along with the VOC constituents in the gas stream. (3) Storm water run-on is collected north of the landfill property in a catchment pond, and pumped around the landfill to the retention basins south of Disposal Road. The basins also provide storage for storm water runoff from the existing landfill. The dust control water comes from the "New Dust Suppression Well" located on the east side of the Operations Building.

Additional groundwater controls are not anticipated for the landfill expansion area. Hydrogeologic information indicates that groundwater elevations are well below the proposed excavation base. Although there is a potential that saturated materials may be encountered during excavation, these materials are expected to be extremely limited in extent and to yield very limited amounts of water for short durations, similar to conditions encountered in monitoring well MW-4A. Once dewatered, placement of the landfill liner over these initially saturated materials would reduce or preclude recharge and re-saturation of these materials.

The possible occurrence of shallow perched groundwater in the landfill expansion area was further investigated by Land and Water Consulting in 2004 by drilling additional monitoring wells along the southern, eastern, and western boundaries of the expansion area. No perched aquifers or shallow groundwater (less than 100 feet below ground surface) was found in any of these wells.

Operation and Maintenance Plan. The Operations and Maintenance Plan (O&M Plan) and a Preliminary Closure/Post-Closure Maintenance Plan have been submitted to the Department for approval. The Groundwater Monitoring and Methane Monitoring plans would be updated for any new monitoring activities associated with the expansion area license conditions. All of these documents would be updated periodically, as on-site conditions change.

Personnel — The District would continue to be responsible for administration and operation of the landfill and proposed expansion area. The day-to-day operations of the landfill are the responsibility of the District director and working foremen. Operations at the facility follow the O&M plan dated April 2005 (Appendix K of the Landfill Expansion Document). There are currently 22 on-site landfill employees. Staff numbers would be increased as the landfill expands. Actual staffing is dependent on the amount of waste to be managed.

Staff training consists of on-the-job training under the supervision of experienced landfill personnel. Employees are provided safety equipment, as appropriate for their particular function. All staff members are trained in accordance with the site's Emergency Response Plan (Appendix J of the Landfill Expansion Document). All employees receive annual load checking training. Employees also attend a 40-hour hazardous waste operations training course and an annual 8-hour refresher course. A contact list is maintained for emergency situations.

Operating Hours — The landfill is currently open to commercial haulers and the public from 8:00 a.m. to 5:00 p.m., Monday through Sunday. The resource recovery area is open the same hours as the landfill. Appointments for all special handling of wastes must be made at least 24 hours in advance. The site is closed on two holidays, Thanksgiving and Christmas. The business hours for the District landfill office are from 8:00 a.m. to 5:00 p.m., Monday through Friday. The hours of operation would remain the same for the proposed expansion. Days and hours of operation are posted on a sign at the facility entrance.

Acceptable Wastes — The existing facility is a Class II landfill and the proposed expansion would not change that. Class II facilities are capable of receiving Groups II, III, and IV wastes but not regulated hazardous wastes. Group II wastes include decomposable wastes and mixed solid wastes containing decomposable materials including dead animals, but exclude regulated hazardous waste. Group III wastes include wood wastes and non-water soluble solids. This includes, but is not limited to, brick, rock, dirt, unpainted, rebar free concrete, untreated, unpainted wood materials, and tires. Group IV wastes include construction and demolition wastes and asphalt, except regulated hazardous waste. The expanded landfill would continue to accept the same types of waste and have separate areas for Class III and Class IV wastes.

Special and Hazardous Wastes — The District has developed and implemented a special waste handling program. This program would continue at the expanded facility. The program focuses on identifying those types of waste that pose a threat to the environment or jeopardize the health and safety of landfill workers. This program addresses the issue of special waste management for legally acceptable wastes as defined in ARM 17.50.503, but which the District prefers to handle separately to minimize personal and environmental risk and/or keep such wastes from being buried in the landfill.

The following wastes are accepted at the landfill using special handling procedures:

Household hazardous waste is temporarily stored in proper containers in a special hazardous waste storage building and transported to a legal disposal or recycling site.

Household used medical sharps are placed in a controlled-access biohazard container. When the container is full, it is hauled to the active disposal area for proper and safe disposal.

Refrigerators, freezers, coolers, air conditioners, and other chlorofluorocarbon-containing appliances are accepted at the recycling facility and processed to remove and store the chlorofluorocarbons. The appliances are then placed in the metal recycling pile for crushing and recycling. The collected chlorofluorocarbon is recycled or reused according to EPA regulations.

Yard waste and other green waste materials are stockpiled within the existing licensed area. Periodically a contractor is hired to grind the material to reduce the volume and generate material for composting or use as biomass fuels.

Tires are accepted from Flathead County residents only. Tires may be landfilled as part of normal operations or transferred to a licensed tire disposal facility.

The landfill accepts regulated and non-regulated, legally characterized and packaged asbestos for disposal according to EPA regulations.

Waste oil is accepted at the recycling facility and stored in a holding tank. When a sufficient amount is accumulated, an oil recycler is contracted to remove the oil for recycling or transport to a legal disposal site.

The District operates a Junk Vehicle Recycling Program under a grant from the Department. The District picks up and transports junk vehicles to the site for processing. The fluids are drained and either recycled or disposed of at a legal disposal site. The vehicles are stored temporarily until a sufficient quantity is stockpiled for crushing and removal by a metal recycling contractor.

Car batteries are accepted at the recycling facility and stored on pallets under a lean-to shelter. When a sufficient quantity of batteries is accumulated, a recycler is contracted to remove them for recycling.

Large and small dead animal carcasses are disposed of at the landfill's active disposal area. The District maintains a log documenting the tonnage of the disposed animals.

Daily Landfill Operations — A scale house attendant records the weight and inspects all incoming loads. Trained landfill personnel direct vehicles to the appropriate unloading area and maintain control over the area for placing wastes. The heavy equipment operators inspect loads for excluded wastes as they spread and compact the waste at the working face. The working face is covered daily with at least six inches of cover soil or an approved alternative daily cover material. The top surface and sides of the advancing lift that will not receive additional waste for 180 days or more are covered with a layer of soil at least 12 inches thick. The expanded facility would operate in the same manner.

Soil Excavation — An estimated one million cubic yards of soil would be excavated from the Class III and Class IV areas and Phases III and IV in the currently licensed area. Approximately 6.2 million cubic yards of soil would be excavated from the expansion area Phases I, II and III. Soil excavated from each phase would be stockpiled in areas of future phases, or on the temporarily unused portions of the active landfill, or on available open space in areas north of the existing scales. This stockpiled soil could be used for daily cover operations, or saved for the final cover. Appendix G of the Landfill Expansion Document includes landfill soil calculations.

Litter and Access Control — Landfill personnel at the entrance control entry during business hours. Perimeter fencing controls unauthorized access to the site. Gates are locked when the facility is closed. A facility identification sign is located at the entrance gate. Signs provide information on the facility, hours of operation, the types of waste that will not be accepted and direct customers to the refuse unloading and resource recovery and recycling collection areas. Other signs display site safety and traffic rules.

Litter fences are placed downwind of the working face. Litter caught on the fences is removed daily or as necessary. All un-enclosed incoming loads must be tarped, and the size of the active working face is minimized to reduce the potential for blowing litter. The facility implements an ongoing litter collection program to minimize litter in areas surrounding the site. Landfill personnel regularly patrol the landfill perimeter and pick up litter. The expanded facility would use the same methods of access and litter control

Severe Weather Operation — During windy weather, the operators may place temporary litter fences in a position to catch blowing debris. If convenient, filling may be done at lower elevations during extremely windy weather. The District Director may shut down operations if necessary during extremely windy weather.

Temporary berms and ditches would be provided when appropriate to divert storm water from the working face and areas where vehicular traffic would occur. Temporary access roads to the working face would be maintained for all weather operations. Wet weather disposal areas may be designated on formerly filled areas of the disposal unit to minimize difficult access for landfill traffic.

A daily cover source would be maintained for cold weather operations. Frost breaking or ripping equipment is available to assist in obtaining cover soil materials. Blasting may also occur as needed to provide a daily cover source during cold weather.

Roads and working surfaces would be wetted periodically as needed for dust control.

Contingency Planning — The landfill O&M Plan, dated April 2005, contains contingency plans for unusual situations. The O&M Plan is included as Appendix K of the Landfill Expansion Document.

Benefits and Purpose of Proposal

The main objective of this proposal is to continue providing cost-effective municipal solid waste disposal for area residents while protecting human health and the environment. Expanding the existing landfill site appears to be in the best interest of the residents because it is generally more cost-effective and efficient to maintain an active landfill site as long as possible rather than opening a new site. The proposed expansion would extend the life of the facility by approximately 15 to 38 years depending on the rate of growth of the area population.

A license expansion at the current site could offer savings in other areas. There are a number of costly requirements relating to post-closure maintenance care and responsibility. Typically, a Class II landfill must be monitored for at least 30 years after it is closed. Remedial action could be necessary to repair the final cover and monitor/remediate any groundwater contamination or methane gas releases. Expanding the existing landfill would allow some closure responsibilities to be integrated with active operations and more importantly, minimize the number of locations requiring 30-year post-closure care. The removal of leachate from the landfill units would lower the potential for a contaminant release beneath the site.

The site is close enough to the towns served to allow for short distance hauling, but not close enough to generate complaints that could arise from a landfill operation. Historically, few complaints have been raised concerning litter, odors, dust or other operations at this site.

Description and analysis of reasonable alternatives whenever alternatives are reasonably available and prudent to consider:

Following the Department's finding that the District's application for the license area expansion was complete, the Department considered two alternatives in the preparation of this EA:

<u>Alternative I</u> — Continued use of the existing site and approval of the license expansion as proposed by the applicant.

Several factors support the viability of this alternative:

- The expansion area on the District-owned property would allow for a refuse capacity of approximately 16.9 million cubic yards over an additional 15 to 38 years of operation.
- The landfill has been receiving waste since 1971 and is currently in compliance with the Montana solid waste laws and rules.
- Since 2002, construction and use of composite lined landfill units has minimized the risk of groundwater contamination.
- An extensive groundwater monitoring system is in place to detect any releases of contaminants. This system would be expanded to encompass the proposed expansion area.
- There is an ongoing need for economical disposal services for area residents.

<u>Alternative II</u> — Deny the license expansion and creation of the Class III and IV units as proposed by the District — the "no action alternative".

If this alternative were chosen the District could:

- Continue to dispose of waste at the existing licensed facility for approximately 14 more years and then close the facility. As of July 2004, the facility has an estimated remaining refuse capacity of approximately 4.9 million cubic yards.
- After the facility, closed the District would transport solid waste to another landfill. The nearest Class II landfill that could accept the volume of waste is in Missoula, approximately 120 miles from to the south. Disposal at the Missoula landfill would involve transportation costs as well as tipping fees, which would cause a significantly increased disposal cost to Flathead County residents.
- Spend a significant amount of time and money to locate, study and license another site suitable for a Class II landfill in Flathead County.

The County Solid Waste District concluded that Alternative I, expanding the current facility was the most practical and economically advantageous option.

Site selection is a local government responsibility. The Department's authority is to examine the license application to evaluate the natural site conditions, facility design, and operations and maintenance plan, and to assess the proposed facility's ability to comply with state laws and regulations.

The Department carefully evaluated the potential environmental impacts of the proposal. The results of the Department's evaluation of the potential site-specific impacts for Alternative I are summarized in Tables 1 and 2 and explained in the Appendix.

A listing and appropriate evaluation of mitigation, stipulations and other controls enforceable by the agency or another government agency:

The proposed expansion must meet the minimum requirements of the Montana Solid Waste Act and administrative rules regulating solid waste disposal. In addition, the following stipulations would be imposed as conditions of licensure:

- Monitor groundwater as required by ARM Title 17, Chapter 50, Subchapter 7.
- Continued operation of the methane gas extraction system.
- Asbestos wastes would be handled according to EPA NESHAP regulations and guidelines for disposal.
- Refrigerant removal would be documented according to EPA CFC/HCFC regulations for disposal.
- All facility design and operational changes would have to be approved by the Department prior to implementation.
- All construction activities and test procedures would be done in conformance with updated and approved specifications, plans, and quality assurance/quality control (QA/QC) procedures.
- The facility master plan and Maintenance and Operations Plan would be updated at least every five years.
- Facility and unit closures would be done according to an updated and approved Closure Plan.
- Prior to initial placement of waste in new disposal cells, the facility would submit and gain Departmental approval of an updated financial assurance mechanism for facility Closure, Post-Closure care, and Corrective Actions if necessary.
- The facility would be required to comply with appropriate provisions of the federal Clean Air and Clean Water acts and associated regulations, as well as applicable County or municipal ordinances.
- The facility would only accept Group II, III and IV wastes.
- The facility would not accept any bulk liquids, septic tank pumpings or regulated quantities of hazardous wastes.
- All construction activities and test procedures performed on the liner would be documented through quality assurance/quality control (QA/QC) measures and would be approved by the Department, prior to construction and installation of the liner.

- The Department-approved liner and leachate collection system would have to be in place prior to the disposal of any waste in the new cells.

- All leachate produced by the landfill facility would first be tested, prior to being subjected to the appropriate treatment and disposal procedures. Reports of all leachate test analyses would be submitted to the Department within 30 days of the sample testing date.

- The department would require that the leachate collection system would be monitored monthly, with verification reporting to the Department. Additionally, records of all leachate-monitoring activities would have to be kept on file at the facility, and would be available to the Department, upon request, during regular business hours.

- A yearly engineering evaluation, to be performed by a licensed professional engineer would be required for the entire landfill facility, including all structures and engineering design features.

- Conditional Open Burning Permits to burn clean untreated wood waste would have to be applied for and obtained from the Department's Air Resources Management Bureau prior to a burn event

- The facility would be required to follow its special waste handling program for all special and household hazardous wastes.

Recommendation:

The Department of Environmental Quality is requesting input from the public regarding this proposal. In the absence of adverse public comment indicating environmental problems that have not been identified or discussed in the EA, the Department proposes to approve and license the proposed expansion, Alternative I, as proposed by the applicant with the listed license stipulations.

If an EIS is needed, and if appropriate, explain the reasons for preparing the EA:

No EIS is necessary because the potential impacts of the proposal on human health and the quality of the environment are anticipated to be minor.

If and EIS is not required, explain why the EA is an appropriate level of analysis:

The Department finds that the construction and operation of the proposed facility would not significantly affect the quality of the human environment. Potential environmental impacts to water resources, terrestrial and aquatic life, vegetation and other aspects of the physical and human environment are expected to be minor for the proposed facility. Potential impacts to the groundwater and surface water resources are expected to be minimized by engineering controls designed for the proposed facility. The

Environmental Assessment is an adequate document to address potential impacts of the proposed landfill facility.

Other groups or agencies contacted or which may have overlapping jurisdiction:
Flathead County

Individuals or groups contributing to this EA:
Flathead County Solid Waste District, Kalispell, MT
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EA prepared by:
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Date: November 10, 2005

TABLE 1. Potential Impacts of Proposed Project on the Physical & Biological Environment

RESOURCE	LEVEL OF IMPACT [1]					
	Major	Moderate	Minor	None	Unknown	Appendix
1. Terrestrial and Aquatic Life and Habitat			X			X
2. Water Quality, Quantity, and Distribution			X			X
3. Geology and Soil Quality, Stability and Moisture			X			X
4. Vegetation Cover, Quantity and Quality			X			X
5. Aesthetics			X			X
6. Air Quality			X			X
7. Unique, Endangered, Fragile or Limited Environmental Resources					X	X
8. Demands on Environmental Resources of Water, Air, and Energy			X			X
9. Historical and Archaeological Sites				X		X

[1] CUMULATIVE AND SECONDARY IMPACTS: The overall impacts are expected to be minor. The potential impact associated with this site is the potential migration of leachate into the underlying groundwater aquifer. Natural site conditions, such as depth to the aquifer, combined with a liner and other strict engineering controls would help limit these impacts. Compliance with the Montana Solid Waste Management Act would also mitigate impacts on human health and the environment and no projects, other than the current landfill, are known to be planned in the area.

TABLE 2. Potential Impacts of Proposed Project on the Social & Economic Environment

RESOURCE	LEVEL OF IMPACT [1]					
	Major	Moderate	Minor	None	Unknown	Appendix
1. Social Structure and Mores				X		
2. Cultural Uniqueness and Diversity				X		
3. Local and State Tax Base and Tax Revenue			X			X
4. Agricultural or Industrial Production			X			X
5. Human Health				X		X
6. Access to and Quality of Recreational and Wilderness Activities				X		
7. Quantity and Distribution of Employment			X			X
8. Distribution of Population				X		
9. Demands for Government Services			X			X
10. Industrial and Commercial Activity			X			X
11. Locally Adopted Environmental Plans and Goals				X		

[1] CUMULATIVE IMPACTS: The operation of a Class II landfill in the proposed location is anticipated to have very minor impacts on the human environment. The increased employment that may be generated by the construction of a state of the art landfill would have a positive but minor impact on the tax base for the county. Open burning would not be permitted in the winter months to minimize the potential for pollution die to air stagnation in the low-lying areas. Compliance with the Montana Solid Waste Management Act mitigates impacts on human health and the environment and no projects, other than the current landfill, are known to be planned in the area.

APPENDIX

EVALUATION OF POTENTIAL ENVIRONMENTAL IMPACTS RELATED TO THE PROPOSED FACILITY

This section evaluates potential environmental effects that could occur if the proposed expansion is approved and licensed. **Bolded headings I and II** correspond to Tables 1 and 2. The number on each of the underlined resource headings corresponds to one of the resources listed in the tables. Generally, only those resources potentially affected by the proposal are discussed. If there is no effect on a resource, it may not be mentioned in the appendix.

Direct and indirect impacts are those impacts (effects) that occur in or near the proposed project area and might extend over time. Often, the distinction between direct and indirect impacts (effects) is difficult to define, thus in the following discussion "impact (effect)" means both types of impacts (effects). The predicted impacts are those effects caused by the selection of Alternative I (proposed project), because Alternative II (no action) has no additional impacts. Cumulative impacts are restricted to the net effects of Alternative I, because no other projects are proposed to affect this geographic area. Secondary impacts are induced by a direct impact and occur at a later time or distance from the triggering action. No secondary impacts are predicted for Alternative I.

I. Predicted Impacts on the Physical and Biological Environment (see table 1)

1. Terrestrial and Aquatic Life and Habitats

Communities of mostly wheat grass, bluegrass, needle grass, June grass, and fescue dominate the natural mixed-grass prairie in the area. The grazed rangeland is predominantly secondary short-grass prairie, much of which has been previously cultivated with introduced species. The coniferous forest in the local area is dominated by communities of Douglas-fir, lodgepole pine, and ponderosa pine. The climax habitat type is Douglas-fir/snowberry with Douglas-fir/pinegrass as a similar habitat type.

The terrain at the proposed expansion and surrounding area consists of northwest-southwest trending drumlins composed of glacial till. There are no springs or saturated areas in the landfill expansion area. The wetland area located approximately ¼ mile south of the landfill expansion area is not believed to be associated with a surface expression of groundwater. The wetland has been classified by the US Fish & Wildlife Service, National Wetland Inventory as "palustrine, scrub-shrub, temporarily flooded" (NRIS database). In wetlands of this type, "surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season" (USFWS, 1979). Given the location of the wetland in a topographic depression and the relatively low permeability of the underlying silty soils, it is most likely that temporary flooding of the area is due to poor drainage particularly during spring snowmelt and rainy periods.

Local indigenous fauna, have largely been displaced by pressure from real estate development and intense agricultural activities.

Any aquatic life would be eliminated from areas that are proposed for use by the facility. Because the wetlands are only seasonal and the area is primarily a dry land area, any impacts to aquatic life would likely be minor. Any terrestrial species inhabiting the area proposed for expansion would be permanently displaced by the landfill during the period of operation. After closure the area would be seeded to range grasses. These impacts would be minor and could be positive if the range grasses provide better habitat than the existing vegetation.

2. Geology and Soil Quality, Stability and Moisture

Regional Geology

The Proterozoic Belt Supergroup that forms the bedrock of the Kalispell region consists of mostly metamorphosed mudstones that were deposited in a narrow seaway during continental rifting along the Alberta-to-Montana axis of the ancient Late Precambrian crust. A passive continental margin then existed there throughout the Paleozoic and into the Mesozoic Period due to the assembly on the Pangaea supercontinent. After the Pangaea supercontinent broke up in the Triassic Period, extensive and extended contraction developed during the Jurassic Period as subduction was initiated along the Laurentide continental margin, again located along the western Alberta-Montana-Wyoming flank. Offshore island-arc terranes associated with British Columbia, Idaho, Oregon, and Washington were progressively docked by subduction during the Late Cretaceous to Early Cenozoic overlapping Sevier-Laramide orogenies. The ancient Cordillera fold-thrust belt then developed during detachment of the Belt Supergroup from the continental margin and thrusting toward the foreland (relative motion from west to east today) as thin wedges of crust were stacked up telescoping eastward toward the front. Arc magmas intruded the core of the orogen to form the Idaho-Boulder batholith toward the west.

The Rocky Mountain trench (RMT) separates the northern Montana fold-and-thrust belt to the east from the magmatic core of the Sevier-Laramide orogen to the west. Early Cenozoic (ca. 60 Ma) convergence on the Lewis overthrust displaced metamorphosed Belt Supergroup rocks about 35 miles east, as the thin-skinned, folded upper Belt sequence slid off the lower Belt during thick-skinned Laramide uplift and intrusion of magma west of the RMT. This contraction, thrusting of sheets, and crustal thickening was followed by protracted extension and block faulting that marked the collapse of the orogen following volcanism. The intermontane basin of the Kalispell Valley, the present-day Flathead and Mission valleys, is an asymmetric half-graben that occupies the southern terminus of the RMT. Cenozoic basin-and-range-style rotational slip on north-northwest trending, westward-dipping normal faults (the Mission fault splays) uplifted the steep western front of the Swan Range and Mission Mountains, while also providing for the thick accumulation of Cenozoic sediments in basins along the deeper eastern flank of the Kalispell graben. Many smaller grabens, like that beneath the local Stillwater Valley outside the western flank of the project area, make up the larger Flathead valley fill. The Cenozoic sediments, and associated unconsolidated fluvial sands and gravels derived from those sediments, host the abundant groundwater resources of the deep, confined aquifer that lies below the project area.

Cyclic advance and retreat of the 4,000-ft thick Flathead Lobe of the Cordilleran ice sheet along the RMT blanketed the upper Flathead Valley with Upper Pleistocene unconsolidated glacial sediments largely derived from erosion of the underlying Belt Supergroup rocks. Terminal moraines were deposited in the Mission Valley when the lobe reached Ninepipes during the earlier Bull Lake ice age (70,000-130,000 yr), but it only advanced to Polson during the later Pinedale glaciation (15,000 yr). Recessional moraines in the upper Flathead Valley at Kalispell, and west of Columbia Falls and Whitefish document the last retreat of the ice lobe. Compact basal till (90 to 250-ft thick) deposited beneath the ice lobe widely blankets the upper Flathead Valley region. It forms oriented moraines and drumlin fields expressed in conspicuous transverse ridges and groups of fluted or linear hills elongated parallel to the south-southeastern advance of the ice. These geomorphic features in the basal till are especially prominent northwest of Kalispell surrounding the project area. The basal till unit forms an impermeable confining layer that separates the underlying deeper, confined valley-fill aquifer in the fluvial and Cenozoic sediments of the grabens from the overlying largely unconfined shallow aquifer in a complex network of Pleistocene glacial outwash, ice-contact stratified drift, and wind-blown eolian units.

Final retreat and wasting of the Pinedale glaciers left stagnant blocks of ice (the largest forming Flathead Lake) upon and around which stratified ice-contact and massive disintegration (ICD) deposits were draped over the basal till. This ICD drift is preserved over bedrock highs in hummocky kame-and-kettle terrain along both margins of the Flathead Valley where complex terranes of ablation till, kames, kame terraces, crevasse-fills, and landslides were layed down during ablation and melt-out of grounded ice. Meltout of buried stagnant blocks of ice formed numerous pothole or kettle lakes throughout the upper Flathead Valley. A complex of large meltwater lakes, associated with ancient glacial Lake Missoula, encroached into topographic lows. These lows were developed during isostatic uplift and erosion by ancestral streams that locally downcut through the Pleistocene units and into the Cenozoic sediments. The basal till and ICD drift were reworked along the lake shorelines and re-deposited in locally thick sequences of rhythmically laminated lake-bed sediments (glacio-lacustrine unit). Some ICD drift was let down onto the top of the varved, silty lake-bed sediments when ice rafts floating in the lake were grounded and melted (most common along the eastern shoreline). Glacio-lacustrine units can also provide a confining layer that separates the unconfined shallow aquifer from the deeper confined aquifer. Subdued kame-and-kettle topography is sparsely developed between the basal drumlins scattered throughout the project area. The ICD units provide an important shallow and largely unconfined aquifer that hosts locally significant, domestic groundwater resources in the project area.

Extensive portions of all the sediments laid down by glacial ice and glacio-lacustrine processes were reworked by pro-glacial streams that formed valley trains depositing the broad sheets of outwash which cover a large part of the Flathead Valley. Quaternary isostatic uplift and associated downcutting and erosion has reworked the Upper Pleistocene glacial sequence and deposited Quaternary alluvial terraces flanking the most recent Holocene alluvial plains now occupied by the present-day Flathead, Stillwater, Whitefish, and Swan rivers. South of Kalispell, the gravelly alluvial plain unit laterally grades into sandy deltaic units that prograded into ancestral Flathead Lake. These outwash and alluvial units host an extensive unconfined aquifer that provides valuable, shallow groundwater resources throughout the upper Flathead valley. Some of the Pleistocene and Quaternary units were reworked into sandy eolian dunes near Creston.

Site Geology

The principal geomorphic features in the present-day Flathead Valley are an east valley terrace, a central valley terrace, ice-scoured hills between Whitefish Lake and the Stillwater River, glaciated terrain northwest of Kalispell and the flood plain of the Flathead and Whitefish Rivers. The proposed landfill expansion area is located in the glaciated terrain northwest of Kalispell where Belt Supergroup bedrock is absent, but composes the pebbles, cobbles, and boulders within the sediments at the site.

The principal investigation of site geology in the area of the landfill expansion was conducted by Morrison-Maierle (1992). This field investigation included geologic mapping and excavation of 41 boreholes and 55 backhoe test pits. Land and Water Consulting (LWC) conducted additional an geologic investigation in 2004 to confirm and verify site geology in the expansion area. The 2004 field investigation included two geotechnical borings and four monitoring wells. Findings of these field investigations are summarized below.

The landfill site is underlain by a complex sedimentary sequence of glacial, stream, and lake (lacustrine) origin. The primary topographic and geomorphic features at the landfill are a series of northwest-southeast trending drumlins (West, East and South Hills) composed of glacial till (Morrison-Maierle, 1992). These drumlins form the gentle hills and ridges in the immediate vicinity of the landfill. The till consists of cobbles and boulders within a silty-clay matrix. Surficial deposits in low areas (swales) between the drumlins primarily consist of glacial lake silts. Low ridges (eskers) of sub-glacial stream-deposited sand and gravels form a rough Y-shaped pattern in the southern portion of the landfill site.

Beneath the surficial features of drumlins, eskers, and swales lies a complex sequence of till interbedded with outwash sand and gravel. This till-outwash sequence overlies a 100 to 140 foot thick, laterally extensive glacial till that forms the confining unit above the deep sand and gravel aquifer. Under the till is a deep sand and gravel sequence, the deep aquifer, that is more than 100 feet thick. This deep confined aquifer extends across most of the Flathead Valley.

Geologic Hazards and Constraints

There are no known faults in the vicinity of the landfill that have had displacement within Holocene time (approximately 10,000 years).

In spite of the lack of historic surface ruptures or geomorphic evidence of fault movement in the area, seismic activity is not uncommon. Kalispell and the proposed expansion site lie near the northwestern end of the Intermountain Seismic Belt that extends from Kalispell southeastward to Yellowstone National Park. The largest recorded earthquake in the Flathead Valley area was a magnitude 5.5 that occurred in 1945. Since 1982, the area has experienced about twenty earthquakes of magnitude 1.5 or more. Most of these events are below the threshold of human perception (Humans may frequently feel earthquakes with magnitudes as small as 2 to 3.).

Probabilistic hazard maps and deaggregation provided 0.38g peak ground acceleration (PGA) from a site-specific design earthquake of modal moment magnitude 6.4 located at 9 km from site. Conservative estimates of seismic displacement (Bray and Rathje, 1998) along the critical liner interface for two critical profiles (Phase NI and NII subunits) failed to exceed the 4-inch threshold for instability. Pseudostatic estimates of intermediate slope stability during filling operations exceed the 1.5 threshold factor-of-safety. Conservative parameters from two lab tests on the strength of the glacio-lacustrine silts in the subgrade buttresses were evaluated in the analyses.

Site Soils, Characterization and Investigation

The principal geologic units as identified by Morrison-Maierle (1992) are described below, in order from older and deepest to younger and shallow.

Unit A: Sand and Gravel of the Deep Aquifer — Unit A is a sand and gravel sequence at least 100-feet thick. The top of the unit is between 155 and 310 feet below the ground surface, at an elevation of about 2,860 to 2,880 feet (surface elevations in the area range from about 3,035 to 3,170 feet). Monitoring wells and most domestic wells near the landfill tap water in this unit. Unit A extends eastward and southward through most of the Flathead Valley. Monitoring wells installed in 2004 confirm the presence and location of the sand and gravel aquifer in the expansion area.

Unit B: Confining Unit of the Deep Aquifer — Unit B is probably mostly glacial till, consisting of an extremely well graded (poorly sorted) bouldery, clayey, sandy silt. It is about 110 to 140 feet thick in the study area and has low permeability. The unit forms the aquiclude over the deep aquifer of Unit A.

Unit C: Glacial Till and Outwash Gravel/Sand overlying Unit B — This is a stratigraphically complex sequence about 50 to 55 feet thick. The unit contains well-graded boulder till in the southwestern third of the study area; the till also extends north along the western margin of the area. The till typically contains 40 to 70 percent gravel-to boulder-sized clasts, and is locally sandy, suggesting a great deal of interbedding of outwash sand and gravel. These materials are identified as Subunit C1. In the central, eastern, and northeastern parts of the area, the unit contains relatively permeable, weakly consolidated sand and gravel, probably with a few interbeds of till. These predominately outwash materials are identified as Subunit C2.

The base of Unit C is about 2,995 to 3,000 feet in elevation, about 35 to 175 feet below the ground surface. Some beds in Unit C are tightly cemented with calcium carbonate (the "hardpan" in some water well logs). Some beds have yellowish, orangeish, or reddish color, suggesting oxidation at a former fluctuating water table.

Unit D: Till of West, East, and South Hills — The till of Unit D crops out in the West, East, and South Hills, and extends under the valley beneath a thin cover of lake silt (Unit F) in the central part of the study area. The till is extremely well-graded boulder silt, with minor clay and sand. Coarse clasts range from gravel through pebbles, cobbles to boulders as large as ten feet in diameter. The percentage of gravel and coarser material ranges from about ten to fifty percent or more.

Unit D till is slightly moist (dry near the surface), dense and compact but not cemented. In the excavation in the West Hill west of the active landfill Unit, the till has crude, thick beds defined by more and less bouldery zones. The bedding dips five to fifteen degrees eastward, and is typical of drumlins.

The till contains a few thin, relatively permeable beds of silt, sand, and gravel, generally with crude bedding which is deformed at many sites. This material is interpreted as outwash silt, sand, and gravel, which was picked up, then redeposited by the glacier.

At most sites, Unit D lies under the lake silt of Unit F and the sand-gravel beds of Unit E, the esker ridge. The till is thickest in the drumlin hills, and quite thin — typically 5 to 15 feet — in the intervening valley. In the valley south of borehole D-4, the till is thin or absent, and Units F (lake silt) and E (esker ridge sand and gravel) lie directly on the permeable sand and gravel of Unit C.

Unit E: Sand and Gravel in Esker Ridges — Unit E contains coarse- to medium-grained sand, sandy and pebbly gravel, and a few interbeds of silt and clay. The unit is, in general, moderately to highly permeable. Sedimentary structures include large-scale crossbeds, ripple cross-lamination; local ice-contact deformation, and minor faulting caused by soft-sediment slumping. The sediments are dry to slightly moist, and unconsolidated to weakly cemented with calcite.

Sand and gravel of Unit E form a narrow Y-shaped ridge, or esker, deposited by a subglacial stream during the Pleistocene. The esker flanks are covered by lake silt, and locally by several feet of glacial till similar to that in Unit D.

Unit F: Glacial Lake Silt — Unit F1: Lake Silt Veneer — A thin (less than one foot to about three feet) layer of silt and minor clayey silt lies over till along the lower slopes of the West, East, and South hills. This silt was deposited in an ice-margin lake or lakes, possibly Glacial Lake Missoula. This unit is similar in lithology to Unit F2.

On some slopes, gravel and cobbles have slid or washed down the slope and onto the silt veneer, from up-slope till exposures. The silt itself has locally been washed down slopes, covering the colluvial gravel and cobbles, creating a crudely bedded composite of reworked till and silt.

Unit F2: Lake Silt in Valley Bottom — The valley bottom is filled with a thin sequence of silt and clayey silt, which was deposited in a glacial lake. The silt laps onto the flanks of Unit E (the esker ridges), and covers the glacial till of Unit D. The lake silt has a few interbeds of clay and fine-grained sand. The unit is weakly consolidated to unconsolidated, and is locally varied. The thickness of the lake silt ranges from less than one foot near its margins, to 23 feet at GLAB-2. GeoLogic Associates completed geotechnical borings in 2004 (GLAB-1 and GLAB-2) to verify the depth of the silt and provide samples for geotechnical testing. Depth of the silt in GLAB-1 and GLAB-2 was 18 and 23 feet, respectively.

Any impacts to geology, soil quality, stability and moisture are anticipated to be minor. The proposed expansion area lies near the northwestern end on the Intermountain Seismic Belt that extends from Kalispell southeastward to Yellowstone National Park. However, little recent movement has occurred on faults in this area. Construction and operation of the proposed facility should not result in soil erosion or the substantial loss of topsoil. Erosion would be minimized through appropriate placement of berms and best management practices such as using straw bales to trap sediment.

3. Water Quality, Quantity, and Distribution

Climate

Flathead County's climate is affected by the Pacific Ocean air masses, which superimpose a late spring maritime influence on the typical continental climatic regime of the Great Plains. Annual average precipitation for this area is approximately 15.6 inches per year with peaks in June and December and lows in October and February. The majority of the average 56 inched per year of snow generally falls from November through February. The mean annual temperature is 43 degrees F with 150 frost-free days. The prevailing wind is from the south at an average of 9.2 miles per hour.

Design criteria for run-off erosion prevention is based on volumes created by a 24-hour, 25-year storm. This would be 2.4 inches of rain in a 24-hour period

Surface Water

The proposed expansion area is situated within the Stillwater Watershed (hydrologic unit code 17010210, Montana Hydrologic Unit Map, 1974). The Whitefish River is located two miles east of the landfill and the Stillwater River is located 0.8 miles west of the landfill. There are no known springs or saturated areas in the landfill expansion area.

The Landfill and proposed expansion area are located in zone “C” on Federal Emergency Management Agency Flood Insurance Rate Map Community Panel Numbers 300023 1415 C and 300023 1405 C. Zone “C” is not located in a 100-year or 500-year floodplain. There is a 15.5-acre depression southeast of the landfill and proposed expansion area in zone “A”, which is designated as an area subject to a 100-year flood.

A wetland area, located approximately ¼ mile south of the expansion area, is not believed to be associated with a surface expression of groundwater. The wetland is classified by the U.S. Fish & Wildlife Service, National Wetlands Inventory as “palustrine, scrub-shrub, temporarily flooded” in the National Register Information System database. In wetlands of this type, “surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season” (USFWS, 1979). Because the wetland is in a topographic depression and the underlying silty soils have a relatively low-permeability, it is most likely that temporary flooding of the area is due to poor drainage particularly during spring snowmelt and rainy periods.

Surface Water Impacts
Since there are no surface water bodies in the vicinity of the landfill or the proposed expansion area there is no surface water monitoring required.

Because there is no discharge of storm water to surface water from the operating facility, the site does not have an MPDES Storm water Permit and does not conduct associated monitoring required under ARM § 17.30.1106. An MPDES storm water permit will be required for the proposed expansion area, however surface water impacts are not anticipated.

Groundwater
The proposed expansion area is located above the deep artesian aquifer (Konizeski, et. al., 1968; Morrison-Maierle, 1992; LWC, 1998a), which is the primary aquifer in the local area. In the area of the landfill and proposed expansion, the hydrogeology of the deep aquifer is conceptualized as a thick, semi-confined flow system with no natural geologic boundaries with the water bearing strata of the deep aquifer typically found at depths ranging from 180 to 240 feet. Once the confining layer is penetrated, water levels rise 60 to 100 feet. Groundwater flow velocities in the deep aquifer are variable, due to varying hydraulic conductivities and gradients. Because of the effectiveness of the composite liner and the minimum 115-foot separation between the base of the waste management units and confined groundwater it is unlikely that there would be any detrimental effects to the deep groundwater aquifer.

The groundwater flow direction in the deep aquifer is controlled by the regional flow system, which flows generally from north to south (LaFave, 2000) with some local variations caused by variations in hydraulic conductivity and the presences of local recharge and discharge sources.

In addition to the deep groundwater system, a localized, perched, shallow groundwater flow system is present along the northern perimeter of the existing landfill (LWC, 1999). The shallow groundwater system is characterized by fairly impermeable glacial till deposits with thin, water-bearing zones. Silt and clay are the predominant materials found in the shallow groundwater system with gravel seams in water-bearing zones.

Near-by Groundwater Supply Wells

According to the Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC) nine private water supply wells and one public water supply well are located south-southeast of the proposed expansion area (Table 1 and Figure 4).

TABLE 1.

GWIC ID	Site Name	Location
205902	Henderson, Dan	29N22W01C
844 77	Hallstrom, Richard	29N22W01CD
146253	Warner, Pat D. and Yvonne V.	29N22W01D
206587	Duo Corporation	29N22W01CD
159308	Solomon, Gary and Linda	29N22W01CDD
188191	Penrod, Eugene A.	29N22W01DC
164408	Gustafson, Kurt	29N22W01DCC
84479	Kellen, Ann	29N22W01DCD
125940	Rustic Inn	29N22W01DBA
155315	Flathead Co.	29N22W01DBDB

Additional information regarding these wells is available online at http://mbmggwic.mtech.edu/. It is important to note that the site description of location for GWIC well 84459 (Figure 4) was recorded without letters and is therefore, shown with its approximate location within section 1 of Township 22N Range 22W.

Water supplies for landfill facilities include the New Shop Well (NSW), the domestic well at the landfill office building (former Cowboy Bar building) and the Dust Suppression Well (Figure7).

Groundwater Impacts

Hydraulic conductivity of the deep aquifer ranges from approximately 15 to 1,000 ft/day (Land and Water, 1998). A relatively high hydraulic conductivity zone is thought to exist in the deep aquifer along the eastern portion of the licensed facility area. Hydraulic conductivities are believed to become progressively lower to the south and west as demonstrated by a steeper hydraulic gradient in the area. The concept of areas of relatively high and low hydraulic conductivity is supported by the results of aquifer tests conducted on wells MW-2, MW-6D, and the NSW. These regions of varying hydraulic conductivity are important in determining the direction and rate of groundwater movement from the landfill area. Based on groundwater modeling (Land and Water, 1998), groundwater transport rates vary from approximately 100 to 1,000 ft/year.

The shallow groundwater flow system is characterized by fairly impermeable glacial till deposits with thin, water-bearing zones. Silt and clay are the predominant materials found in the shallow groundwater system with gravel seams in the water-bearing zones. These permeable, water-bearing layers are believed to be outwash channel deposits intercalated within the glacial till. Shallow groundwater is believed to be principally recharged by precipitation, snowmelt and storm water runoff from the old landfill area, and to a lesser extent, surface water drainage originating from the drainage basin located north of K-M Ranch Road. Based on pumping tests of groundwater monitoring well MW-8, hydraulic conductivity of the shallow aquifer is estimated to be 2 to 5 ft/day (LWC, 1999).

Dewatering of the shallow groundwater system has been taking place since January 2000 as a corrective measure to control migration of contaminants from the old, unlined portion of the landfill. Installation of the shallow groundwater pumping system has been described in detail in LWC (1999b). Drilling, installing, and sampling the groundwater interceptor wells in the northern drainage area was completed from July 12 through September 13, 1999. Fifteen soil borings were drilled in the northern drainage area. Nine of the borings were completed as groundwater interception wells (GIWs). These wells draw water from relatively thin outwash channel deposits inserted as layers within the glacial till.

Shallow perched groundwater is either absent or present in very limited quantities in the expansion area. Morrison and Maierle (1992) identified no shallow or perched groundwater systems in their initial investigation of the expansion area, although they did find permeable outwash deposits in the till in the area. During subsequent work by Morrison and Maierle (1994) in which the deep monitoring wells (MW-1 through MW-4) were installed, a small amount of perched shallow groundwater was found at MW-4. A shallow well, MW-4A, was installed adjacent to MW-4 to further investigate and monitor the perched groundwater. When MW-4A was drilled, perched groundwater was initially found in a thin sandy silty gravel lens from 35 to 38 feet below the surface. During drilling and well development activities, the aquifer was dewatered after removal of only 50 gallons of water. Several months after well development, MW-4A was still dry. Over the next two years Morrison and Maierle attempted to use the well for monitoring and concluded, “MW-4a [has] not produced sufficient water to obtain samples for water quality properties, suggesting that the perched aquifers near the landfill may not be a practical water resource.” (Morrison and Maierle, 1995). Monitoring well MW-4A was plugged and abandoned in 2000.

In 2004 Land and Water Consulting investigated the possible existence of shallow perched groundwater in the expansion area was further by drilling additional monitoring wells along the southern, eastern, and western boundaries. They found none.

Hydrogeologic Evaluation of Landfill Performance (HELP) Models

Modeling of potential leachate generation within the entire landfill expansion was completed using the U.S. Army Corps of Engineers HELP3 model. The model calculates water balances in daily increments, and can provide output for daily, monthly, and annual values for precipitation, run-off, evapotranspiration, percolation, and lateral drainage. The modeling simulated a refuse fill placed over the entire liner development system. The rate of leachate generation and accumulation calculated by the model were the primary parameters used in designing the leachate collection and removal system.

With the exception of the iterative moisture contents described below, all soil and refuse parameters used in modeling the leachate system are default values selected from the HELP program as typical for municipal solid waste landfills. Weather data was synthetically generated by the program for the Flathead County area and corrected for the latitude of the facility, yielding an average annual rainfall total of approximately 16 inches.

To produce conservative results, the HELP modeling for the project assumed that the subgrade beneath all development areas would be at a 2 percent gradient, and that yearly thickness of refuse would be no greater than 80 feet. Even though wastes initially placed in landfills are typically dry, with a moisture content that is well below their moisture holding capacity, for the model leachate generation analyses, it was assumed that the upper 10-foot refuse section in each yearly simulation would exist at its field capacity. The moisture content for underlying refuse layers was manually specified for each yearly simulation based on the results that were calculated for the previous year. As additional conservative measures, runoff was assumed to be impeded by a “fair stand of grass” though, for simulating transpiration, a bare ground (daily cover) condition was assumed.

Current estimates are that the existing and expanded landfill may operate for 29 to 57 years (as of 2004) based on a two percent or eight percent growth rate factor. During this period, the landfill is planned to be developed in six major areas that have differing footprints, subgrade gradients, and refuse thickness as listed below. These assumptions were used in the modeling.

The HELP simulations were run for a period of 30 years. The simulations conservatively ignored placement of intermediate cover soils, and assumed that a one-foot thick leachate drainage layer would be placed at a 2 or 3 percent gradient on top of a geomembrane layer at the base of refuse. Leachate collection pipe was assumed to be on 200-foot centers.

The help model calculations predicted that the peak daily leachate depth would be approximately 2.2 inches. This would occur within 30 years of refuse placement with periodic spikes that follow and which might be related to variable annual rainfall. The peak daily leachate generation amounts to approximately 99,500 gallons or an approximate flow rate of 0.15 cubic feet per second. The 200-foot spacing of the leachate collection pipes appears more than adequate to keep less than one-foot of leachate head on the liner.

The current operation returns all leachate to the active lined landfill area for dust suppression, therefore, the storage of leachate only needs to allow for the redistribution of the leachate into the landfill cell in which it was generated. The capacity of the leachate system can be minimal, but the facility will have the ability to plan for the use of temporary storage tanks on emergency basis to match peak flows if it becomes necessary.

4. Vegetation Cover, Quantity, and Quality

The existing expansion area is temporarily being used for the growing of alfalfa. The District uses storm water from the lined ponds for irrigation; therefore, there are no special plant species in the expansion area. Once the landfill operation is completed, the area will be returned to native habitat. These impacts could be positive, as the post-closure vegetation would likely provide for a better diversity than the existing alfalfa monoculture.

5. Aesthetics

Visual — The proposed expansion would likely have only minor impacts on aesthetics because the expansion area is seven miles north of the city of Kalispell. The expansion area is immediately south and southeast of the existing licensed area.

The expansion area would be developed to minimize the visual impacts from Highway 93. This would include the phasing of the landfill and operations being conducted behind berms when possible. The District has planted trees along Highway 93 to minimize the near view of the expansion area. The final contours of the closed landfill are planned to resemble nearby hills.

Litter Control — All vehicles coming to the facility would be required to have their loads covered and the waste would be covered with alternative daily cover or earthen material daily. In addition to perimeter fencing and portable litter screens, which would catch much of the litter escaping from the refuse disposal area, the landfill would use laborers to keep the area free of debris and excess trash.

The aesthetic impacts from small amounts of windblown litter are found to be minor due to the extremely sparse development and human population surrounding the proposed expansion area.

6. Air Quality

Air quality concerns related to sanitary landfills are frequently associated with increased dust from landfill traffic, and construction and maintenance activities. The current landfill has an air quality permit for the methane flare.

Additional traffic on the road from Highway 93 to the landfill, related to the construction of the landfill expansion, could cause an increase in the levels of airborne dust. If this occurs, dust suppression methods such as watering the road would lessen the impact. Construction of new landfill cells would cause an increase in internal landfill traffic and airborne dust during the period of excavation and construction of the base. If dust from construction were to become a problem, dust control measures such as wetting the surface before working on it, would be initiated. Normal operational traffic on the site could cause a minor increase of suspended dust particles in the air during the dry months of the year. If this became a problem, it could be mitigated by adequate dust control measures on the interior roads such as applying a dust palliative or water.

The excavation and placement of cover material could increase the dust in the air. If it became a problem, the cover material could be wetted prior to its lay-down so that the net effect would be minor. All long-term soil stockpiles would be seeded to prevent erosion and airborne dust.

Decomposing buried waste can produce varying amounts of methane, depending on the amount of water reaching the waste. A properly constructed cover on the landfill minimizes the amount of water that seeps down to the waste by storing the precipitation so that it may evaporate from the land surface and be transpired by the vegetation growing on it.

The existing landfill has a landfill gas collection system. This gas collection system would be expanded into the expansion area, if necessary, to collect methane gas generated from the facility. There would be methane-monitoring wells located at the corners of the proposed expansion area. These wells would be monitored quarterly to assure that standards for lateral migration of methane are not exceeded at the boundary.

All activities at the landfill, including fugitive dust emissions are subject to the conditions of the air quality permit.

Overall, air quality impacts are anticipated to be minor.

7. Unique, Endangered, Fragile or Limited Environmental Resources

A search of the Montana Natural Heritage Program website (NHP, 2005) found records for one mammal species of concern in the site-specific Township/Range within Flathead County, the Canada lynx (Lynx Canadensis). The Canada lynx is classified as threatened. A lynx has never been observed in the vicinity of the landfill or proposed expansion site, however, no intensive site survey was conducted.

8. Demands on Environmental Resources of Water, Air and Energy

Energy demands related to landfill operation are primarily due to the hauling of waste to the facility. Lesser demands are from excavation and construction of new cells, and the compaction, covering and other routine landfill activities. Waste is now being hauled to the currently licensed facility and would be hauled to the expansion area, adjacent to the current operation. Construction and operation of the proposed expansion would not cause an increase in fuel use. Continuing to use the current site would cause considerably less fuel to be used than if the waste were transported to the nearest licensed Class II landfill in Missoula, approximately 120 miles away. Expanding at the current site, rather than hauling waste to the Missoula Landfill, would be a major savings in the amount of fuel used for waste disposal.

9. Historical and Archaeological Sites

Prior to conveyance of the purchased land to District, an intensive cultural resource inventory survey was conducted on the proposed expansion area. There are no known sites that qualify for listing in the National Register on the parcels proposed for landfill expansion.

II. Potential Impacts of the Proposed Project on the Social & Economic Environments (see table 2)

1. Local and State Tax Base and Tax Revenue

Construction of the proposed expansion facility could have a minor positive effect on the local tax base because of the additional jobs created during the construction phases. In addition, the landfill operation will continue to provide jobs in the Flathead Valley, which has a positive effect on the local tax and revenue base.

2. Agricultural or Industrial Production

The expansion of the landfill will only have minor effects on agriculture production, because of the loss of the production of the temporary alfalfa field that the District is currently operating.

3. Local and State Tax Base and Tax Revenue

Construction of the proposed facility could have a minor positive effect on the local tax base because of the additional jobs created during the construction phases.

4. Agricultural or Industrial Production

The construction of the landfill expansion would take a small amount of hay producing land out of production. This would be a minor impact to the agricultural production in the Flathead valley.

5. Human Health

It is anticipated that there would be no impacts to human health. The liner and leachate collection and removal systems protect the groundwater and there are no nearby residences downwind of the facility that would be impacted by dust resulting from operations. The air quality permit limits the amount of fugitive dust allowed at the facility.

Proper operation of modern sanitary landfills using appropriate daily and intermediate cover minimizes scavenging by birds and mammals. The current landfill does not have elevated problems with scavengers and it is anticipated that by continuing good operational practices, the expanded landfill would also not have problems with scavenging by gulls, crows, ravens, or birds of prey. By adhering to these practices impacts to raptors and other birds would be minimized to that currently present.

Insects are seldom a problem at a properly operated landfill. Improperly compacted and covered waste may cause increases of nuisance insects and disease vectors, such as mosquitoes and flies. However, the facility's operation plan requirement for covering waste on a daily basis should continue to control any potential problems.

7. Quantity and distribution of employment

During the construction phases of the expansion there could be a minor positive effect on employment due to the possible increased employment for construction activities.

During the construction phases of the landfill expansion, there could be a minor positive effect on employment due to the possible increased employment (including the need for outside contractors) for construction activities. The expansion of the landfill in the existing site as opposed to hauling the waste to another landfill would have a positive affect on the current employees, i.e., they would not lose their jobs.

9. Demands for Governmental Services

The potential impact of the proposed facility would be minor. The Department would perform inspections of the site during and after construction in addition to the regular inspections that are currently conducted on the operating landfill.

During the construction phases, there would be slightly increased traffic on roads leading to the landfill, but the impact is expected to be minor because very little added wear and tear or traffic enforcement would result due to the few contractors involved over several months.

The local public collection system is set up around the existing facility; therefore, the expansion will not increase the demands on government services to restructure the collection and transportation to another landfill.

10. Industrial and Commercial Activity

Construction of the proposed facility would have a minor increase in the industrial activity of the area during construction due to the need for contractors and associated equipment and machine repairs. No significant secondary impacts to industrial or commercial activity of the area are expected due to this proposed expansion. The facility would continue to provide a legal and environmentally sound waste disposal option for industrial and commercial establishments in Kalispell and surrounding Flathead County.

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